FEDERAL HIGHWAY ADMINISTRATION

Long Term Pavement Performance
Specific Pavement Studies

UTAH SPS-8

Construction Report on Site 490800
State Route 35 (Wolf Creek Road)

FINAL

Prepared for

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ABSTRACT

It is well known that environmental climate and geology affect pavement performance. Environmental conditions, alone or interacting with the pavement materials, may generate major distresses in pavements. The objective of this Specific Pavement Studies experiment, SPS-8, "Study of Environmental Effects in the Absence of Heavy Loads," in Wasatch County, near Francis, Utah, is to measure the deterioration of pavement performance in the absence of heavy traffic loading. The State Highway 35 SPS-8 project combines two test sections with varying base course and asphalt concrete thicknesses in a very low volume traffic environment with extensive weather variations. The construction of the sections was closely monitored to ensure the sections were built to specification. Construction began in June 1996, and paving was completed October 16, 1997. Details of construction are presented in this report, along with minor problems encountered during construction that may affect the pavement performance.

I. INTRODUCTION

The Strategic Highway Research Program (SHRP) Specific Pavement Studies experiment, SPS-8, was designed as a "Study of Environmental Effects in the Absence of Heavy Loads." Environmental conditions, acting alone or interacting with pavement materials, may generate major distresses in pavements. Frost heave, soil swell, and low temperature cracking are common environmentally related distresses that have little or no traffic related components. The objective of the SPS-8 experiment is to measure the deterioration in pavement performance in the absence of heavy loads. This report covers the construction of the SPS-8 project near Francis, Utah.

SPS-8 PRODUCTS

The primary products of the SPS-8 experiment are the:

- Evaluation of existing environmental effects (damage) models,
- Determination of the effects of specific design features, thickness, and pavement types on pavement performance in the absence of heavy loads, and
- Development of a comprehensive database for use by state and provincial engineers and other researchers for evaluating environmental effects on pavement performance.

II. SPS-8 PROJECT DESCRIPTION

This SPS-8 project was constructed in Wasatch County on State Route 35 (Wolf Creek Road) near Francis, Utah (Figure 1). The sections are located in the eastbound lane, 0.6 mile east of the Provo River. The two monitoring test sections, both 500 feet long, were constructed with varying asphalt and base thicknesses as shown in Figure 2. The cross-sections for each section are shown in Figures 3 and 4. The sections were ordered as follows:

- Section 490803: From station 44+50 to 49+50, and
- Section 490804: From station 52+50 to 57+50.

The terrain in the immediate area consists of rolling hills with scattered brush and trees. The site has a longitude of 111°08'04.9", a latitude of 40°33'27.4", and an elevation of 7300 feet. Based on existing climatic data, the maximum air temperature for this area is 87 °F with an average of 55 °F. The minimum air temperature is –14 °F with an average of 26 °F.

This site was originally nominated as having a fine subgrade, however, testing conducted later indicated the subgrade was coarse. The site was rated at a low level of activity due to minor frost heave.

The design annual average daily traffic (AADT) for this roadway was 390 vehicles per day with 2% trucks. For a design period of 20 years, the total design equivalent single axle loads (ESALs) is approximately 24,000.

This project was constructed by Central Federal Lands with the agreement that the Utah Department of Transportation would take over responsibility for the roadway—including the SPS-8 test sections—upon its completion. Richard Duvall from Central Federal Lands was instrumental in coordinating all phases of the project, particularly the materials sampling and testing.

The primary contractor for the project was Stimpel-Wiebelhaus Associates. They performed the earthwork through the placing of the base course. The paving subcontractor for this site was Valley Asphalt. The resident engineer for Central Federal Lands was Norm Merrill. Doug Frith, Pete Pradere and Kevin Senn, representing the Western Region, were present at various phases of construction for LTPP monitoring.

In order to assure the proper climatic data would be available during analysis, an Automated Weather Station (AWS) was installed by the Western Regional Contractor (Photo 1, Appendix A). The AWS is located less than a mile from the project at MP 9.0 of S.R. 35. It was placed here so it could receive full exposure to the sun and wind conditions, as the slope nearer the test sections are too great to allow this exposure. Stimpel-Wiebelhaus constructed the foundations for the equipment and connected the electrical power. Nichols Consulting Engineers, Chtd. (NCE) personnel installed the AWS equipment on November 18, 1996, but the electricity wasn't hooked up until December 19, 1997. The installed equipment consists of a wind monitor that

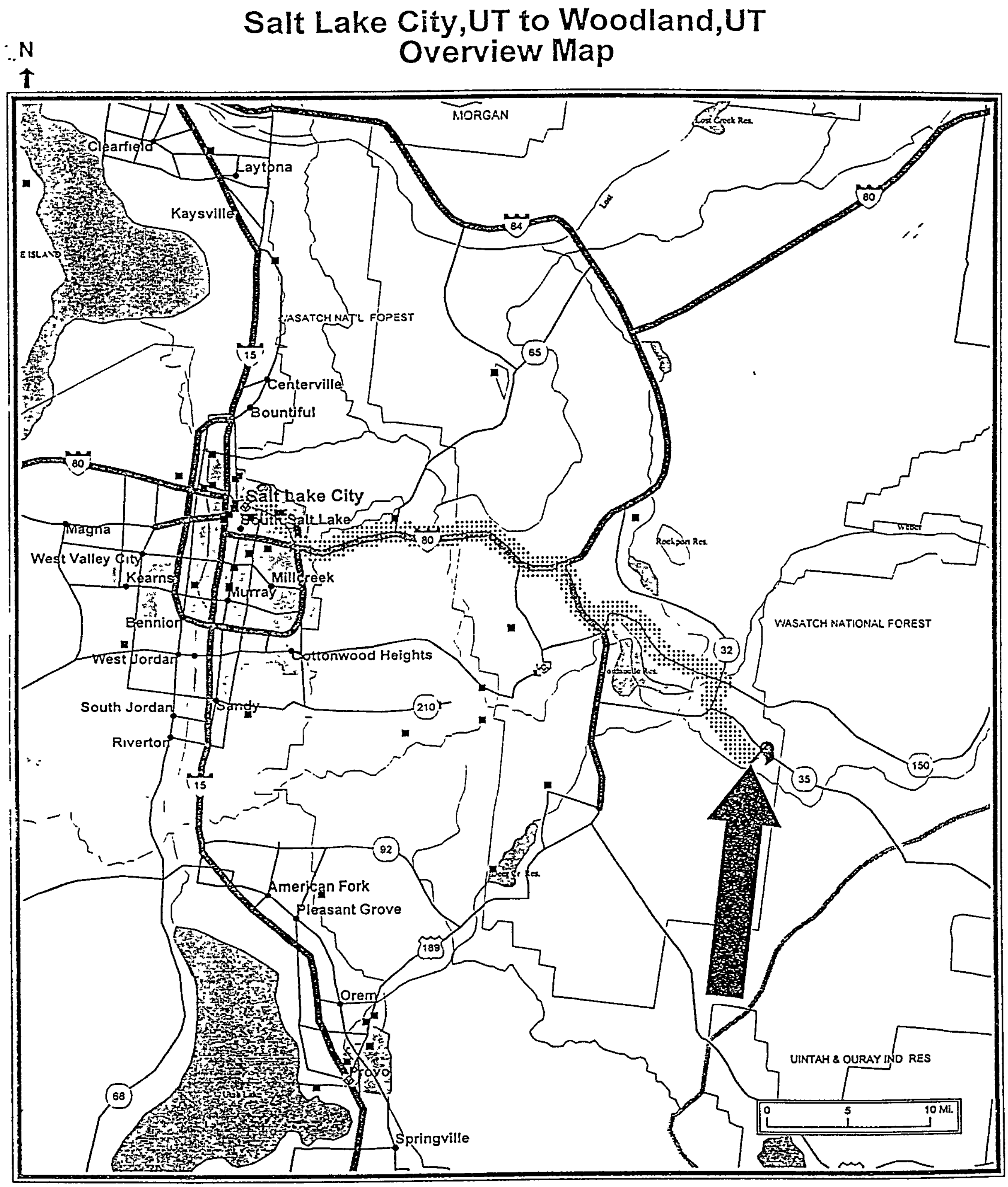


Figure 1. Site location.

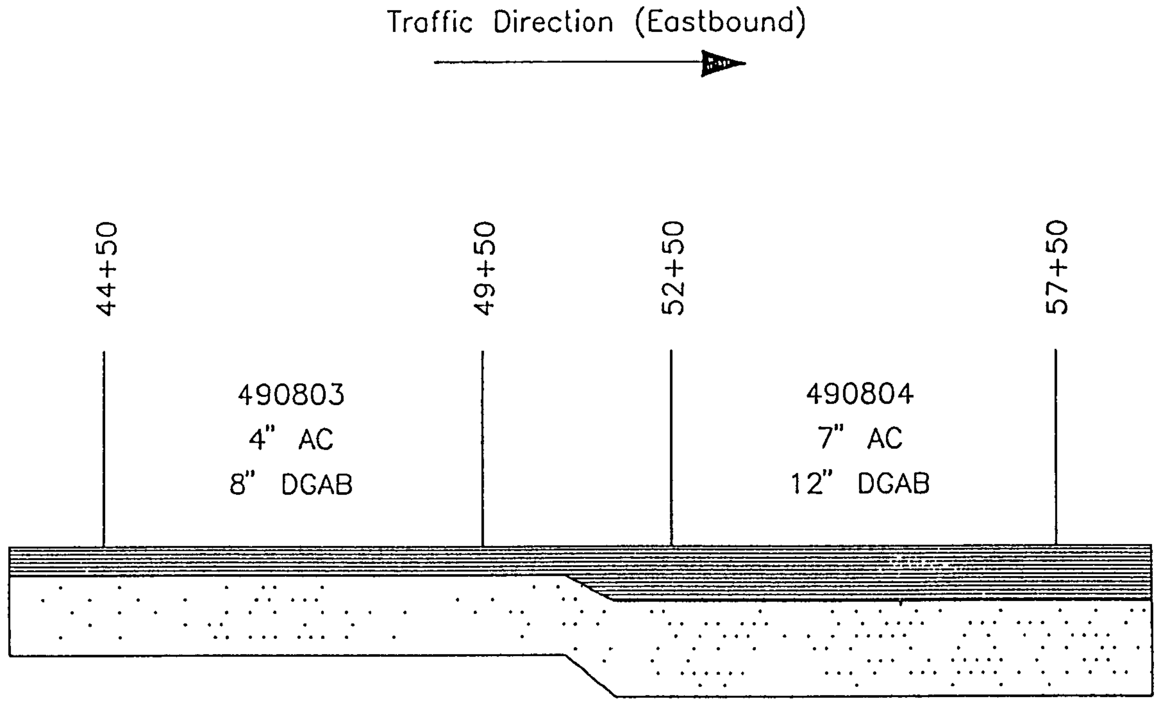
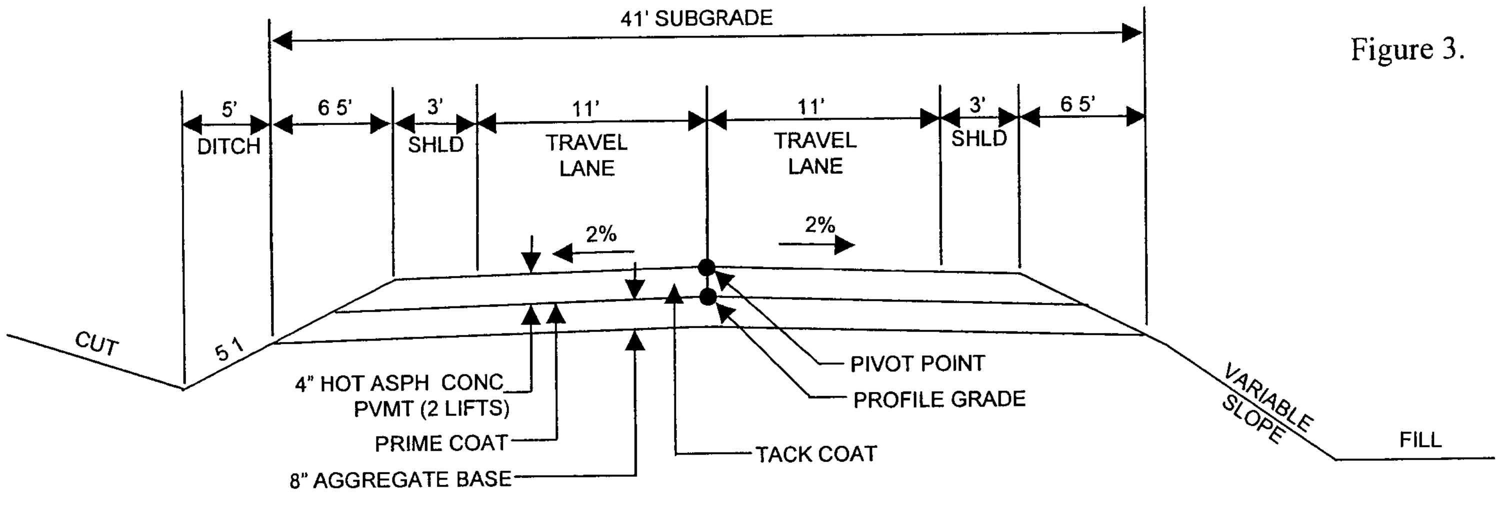


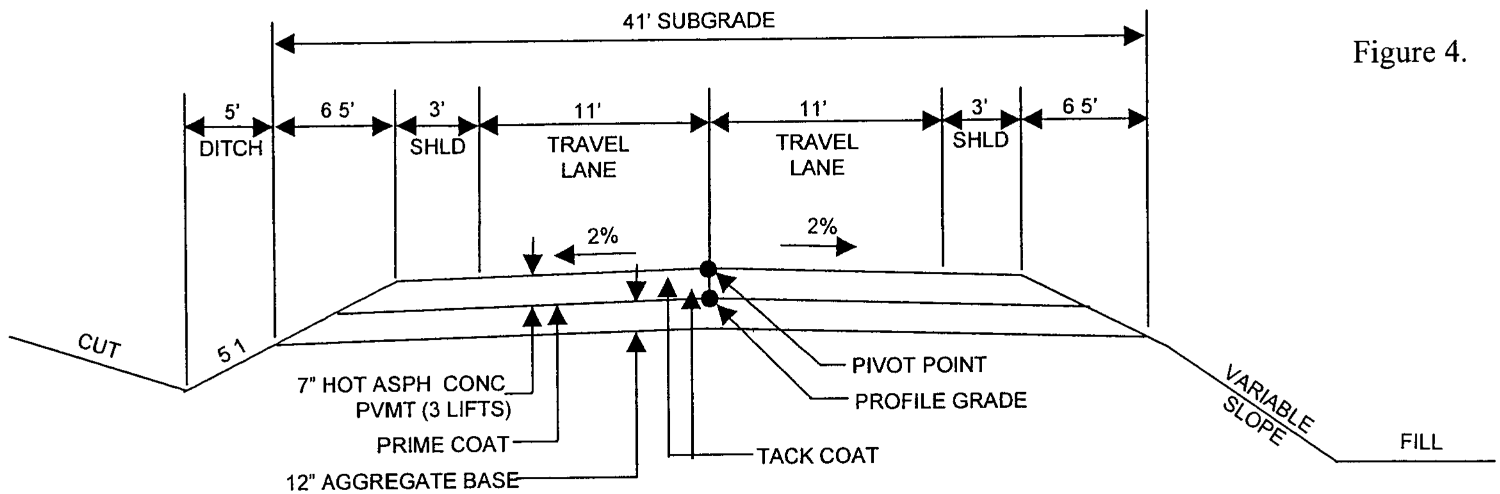
Figure 2. Layout of experimental test sections, Utah SPS-8 project, S.R. 35.

Figure 3.



SHRP TEST SITE #1

Figure 4.



SHRP TEST SITE #2

measures wind speed and direction, a probe to measure the temperature and humidity, a pyranometer to measure solar radiation, a rain gauge tipping bucket, a solar panel and a datalogger. All equipment was provided by FHWA.

III. CONSTRUCTION

Construction of the SPS-8 project began in June 1996. The project consisted of reconstructing an existing roadway which included widening and alignment. The first step in the test section construction was the removal of the existing asphalt concrete surface. The existing AC was scarified, windrowed and removed from the roadway. The contractor then began to construct the subgrade profile.

EQUIPMENT

The following equipment was used in the construction of the subgrade and base layers on the SPS-8 test sections for the Wolf Creek Road construction site:

- 4 769B rock trucks
- 1 825B sheepsfoot roller
- 2 CAT 637D scrapers
- 3 CAT 631C scrapers
- 1 SD-100 sheepsfoot drum
- 2 Komatsu PC400LC trackhoes
- 1 Komatsu PC300LC trackhoe
- 1 CAT D8L bulldozer
- 1 CAT D8K bulldozer
- 1 CAT D9L bulldozer
- 1 140G grader
- 1 CAT 416B backhoe
- 2 water trucks
- 1 980C loader
- 1 CA30 drum roller
- 1 Komatsu PC650LC trackhoe

SUBGRADE

After the pavement was scarified, the contractor worked the subgrade using a grader and a roller (Photo 2, Appendix A). The material was dark brown and appeared to be a silty clay. Table 1 summarizes the gradation of the subgrade material.

Table 1. Subgrade gradation.

Sieve Size	Percent Passing by Sieve Size		
	Section 490803	Section 490804 (1)	Section 490804 (2)
3 in.	100	100	100
2 in.	100	95	96
1 1/2 in.	98	93	95
1 in.	94	89	88
3/4 in.	89	84	85
1/2 in.	82	77	81
3/8 in.	78	73	78
#4	68	64	72
#10	62	58	67
#40	55	51	60
#80	46	44	52
#200	37.8	35.1	41.7

Materials sampling was performed on June 25, 1996. A backhoe was utilized to gather the bulk samples (Photo 3, Appendix A), which were taken according to the materials sampling plan (Appendix C). The only exception to the sampling plan was that it was too rocky for Shelby tube samples to be collected. Density testing was performed and the results are presented in Table 2.

Table 2. Subgrade density test results.

Section	Date	C/L Ref.	Station	Average Dry Density (pcf)	% Optimum Density	In Situ Moisture Content (%)	% Optimum Moisture Content
490803	6/25/96	7' Right	0-25	118.7	104	11.1	83
			1+00	114.0	100	12.2	92
			2+50	108.5	95	14.5	109
			4+00	109.8	96	14.0	105
490804	6/25/96	7' Right	0-40	104.7	92	10.4	78
			1+00	107.3	94	14.6	110
			2+50	109.0	95	13.7	103
			4+00	97.5	85	14.5	109
			5+25	104.9	92	12.9	97

On June 25, 1996, FWD testing was performed on the test sections. However, the subgrade was very moist, and the deflections were outside the allowable range of the FWD sensors in several areas. The decision was made to return the following morning and to keep traffic off of the subgrade until after the embankment was placed. Upon arriving on-site June 26, the subgrade had dried out, but there was irrigation runoff crossing through section 490804 between station 0+00 and 0+50 and flowing down the right edge of section 490803 (Photo 4, Appendix A). Therefore, only section 490804 was retested. The results were still outside the allowable range of the FWD sensors. Therefore, subgrade FWD results are not presented herein.

EMBANKMENT

A visit was made to the site on July 9, 1996, for the purpose of witnessing the placement of the embankment material. The material was hauled to the site from a major cut section farther up the same construction project by scrapers and then compacted using a sheepsfoot roller. Loaded scrapers hauling materials to other parts of the project also aided in the compactive effort. The embankment material was very rocky, and had a small amount of organic material in the form of tree and bush roots that were removed by root pickers working for Stimpel-Wiebelhaus. The layer placed during this visit was the third of three lifts for the embankment (Photo 5, Appendix A).

Materials sampling was performed on the embankment August 11, 1996. As with the subgrade, a backhoe was used to aid in the bulk sampling. Laboratory testing of the material showed it to be primarily silty sand with gravel. Table 3 summarizes the gradation of the embankment material. Density testing was also performed (Photo 6, Appendix A), and the results are summarized in Table 4.

Table 3. Embankment gradation.

Sieve Size	Percent Passing by Sieve Size		
	Section 490803	Section 490804 (1)	Section 490804 (2)
3 in.	92	84	85
2 in.	90	76	81
1 1/2 in.	85	74	76
1 in.	81	68	73
3/4 in.	77	65	69
1/2 in.	71	59	64
3/8 in.	67	56	60
#4	56	48	50
#10	48	41	43
#40	41	35	36
#80	38	32	33
#200	32.6	28.2	29.8

Table 4. Embankment density test results.

Section	Date	C/L Ref.	Station	Average Dry Density (pcf)	% Optimum Density	In Situ Moisture Content (%)	% Optimum Moisture Content
490803	8/12/96	7' Right	0-25	124.8	102	6.5	56
			1+00	131.1	107	5.6	48
			2+50	130.2	107	5.9	51
			4+00	127.1	104	4.8	41
490804	8/12/96	7' Right	0-45	130.8	107	5.7	49
			1+00	127.4	104	5.5	47
			2+50	129.6	106	5.9	51
			4+00	125.0	102	5.3	45
			5+25	126.1	103	5.6	48

As per the sampling plan, a drill rig was on site to collect the shoulder auger samples (Photo 7, Appendix A). The drill rig was from Central Mix Equipment (CME), and Steve Slack from Bingham Engineering was on hand to examine and classify the cores. The auger samples were supposed to be measured down to 20 feet. However, at two locations at 0803 and at another two locations at 0804, refusal was reached at only 7 feet. It was decided that no further locations be tested as they would show the same refusal due to the rocky nature of the subgrade. The results of the partial borings are shown in Table 5 and 6.

Table 5. Shoulder probe log of section 490803

Depth	Material Description	SPT*
0.0'	silty sand w/ gravel: lt. brown; fine sand; fine-coarse gravel; v. dense; dry	12/25/34/43
2.0'	same as above	15/23/26/26
2.8'	asphalt piece: 1.5" thick	
2.9'	silty sand w/ gravel some clay; dark brown; fine sand; fine to coarse gravel; some minus #200 w/ cohesiveness; v. dense; dry	
4.0'	same as above except lt. brown-reddish; slightly moist; very dense	18/4.5"-50
6.0'	silty sand w/gravel; greater % of sand than above; reddish brown fine-med sand; slightly moist; very dense	20/5.5"-50
6.2'	silty sand w/gravel; dark brown; fine sand; fine-to coarse gravel; slightly moist; very dense	
6.75'	refusal	

*blowcounts = x/x/x/x; for refusal depth of penetration = depth"-blowcount

Table 6. Shoulder probe log of section 490804.

Depth	Material Description	SPT*
0.0'	silty sand w/gravel; fine sand; fine-coarse gravel; lt. brown-dark brown; very dense; dry	20/31/35/27
2.0'	silty sand w/gravel; some clay; same as above; pieces of wood 1-2" long	11/4"-50
3.3'	silty sand; dark brown; fine sand; some fine gravel; root structure evident; dry; very dense	10/11/16/35
6.0'	silty sand w/gravel; reddish-orange; fine sand; dry; very dense	5"-35
6.5'	refusal	

*blowcounts = x/x/x/x; for refusal depth of penetration = depth"-blowcount

DENSE GRADED AGGREGATE BASE

The base course consisted of an alluvial stone from the Fitzgerald Pit in Francis. The haul distance between the pit and the test sections was 10 miles. The grade was attained using the CAT 140G grader, and the material was compacted using a Dynapac vibratory roller (Photos 8 and 9, Appendix A). Although the base was placed in September 1996, no sampling was performed at this time because no further work was scheduled on the project until the following spring. The section had a tack coat placed on it, and was left for the winter (Photo 10, Appendix A).

In the spring, there were a number of locations along the project that needed repair (Photo 11, Appendix A). Therefore, it was determined that the material sampling should not take place until shortly before the test sections were scheduled to be paved. This sampling took place July 10, 1997. The bulk samples were taken with a pick and a shovel as no backhoe was available. Table 7 shows the gradation of the base layer. Nuclear density testing was also performed and the results are given in Table 8.

Table 7. DGAB gradation.

Sieve Size	Percent Passing by Sieve Size		
	Section 490803	Section 490804 (1)	Section 490804 (2)
3 in.	100	100	100
2 in.	100	100	100
1 1/2 in.	100	100	100
1 in.	100	100	99
3/4 in.	100	100	99
1/2 in.	91	94	91
3/8 in.	79	82	74
#4	85	58	48
#10	38	44	35
#40	31	36	29
#80	18	21	17
#200	8.4	9.1	7.7

Table 8. DGAB density test results.

Section	Date	C/L Ref.	Station	Average Dry Density (pcf)	% Optimum Density	In Situ Moisture Content (%)	% Optimum Moisture Content
490803	7/10/97	6' Right	0-30	131.0	98	3.3	40
			1+00	127.0	95	4.9	59
			2+50	128.6	97	3.8	46
			4+00	127.8	96	4.0	48
490804	7/10/97	6' Right	0-50	129.3	97	3.3	40
			1+00	128.0	96	2.9	35
			2+50	129.7	98	3.9	47
			4+00	129.7	98	3.8	46
			5+25	129.1	97	3.3	40

Table 9 lists the thickness statistics obtained from both sections. The measurements were taken 0, 3, 6, 9, and 12 feet to the right of centerline, at 50' intervals, by rod and level survey. Figure 5 illustrates the DGAB and AC layer thicknesses at fifty foot intervals along the project.

Table 9. DGAB thickness.

Section	Minimum Thickness (in.)	Maximum Thickness (in.)	Average Thickness (in.)	Specified Thickness (in.)	Standard Deviation (in.)
490803	4.7	9.6	7.8	8	1.16
490804	9.8	13.4	12.0	12	0.89

ASPHALT CONCRETE

The asphalt mix design consisted of granite as the primary aggregate and sandstone as the secondary aggregate, and 5.8% PG 58-34 asphalt binder. Table 10 shows the laboratory blend aggregate gradations of the mix as determined from aggregate extracted using an ignition furnace. Table 11 shows the aggregate gradations of the mix as determined from Abson extracted aggregate. The original data submittals and further detailed testing results are located in Appendix B. The mix design is summarized in Table 12. Table 13 shows the loose lift thicknesses and laydown temperatures for each lift on both sections. Table 14 shows the compacted density of the AC mat using a nuclear gauge and Table 15 shows the compacted thickness of the AC layer.

Falling Weight Deflectometer (FWD) tests were performed on the AC surface as well as the DGAB and embankment layers. Figures 6 through 9 show plots of the deflection of sensor 1 taken in both midlane and wheelpath along the entire extent of the test sections. Note that the deflections of the DGAB are greater than the deflections of the embankment. This counterintuitive behavior can possibly be explained by the fact that the FWD tests on the embankment were performed just after the embankment was placed whereas the FWD tests on the base were performed quite a while after the placement of the base material. The base material was subjected to a wet winter season after placement and prior to testing. This introduced environmental factors that could account for the counterintuitive deflection behavior of the base.

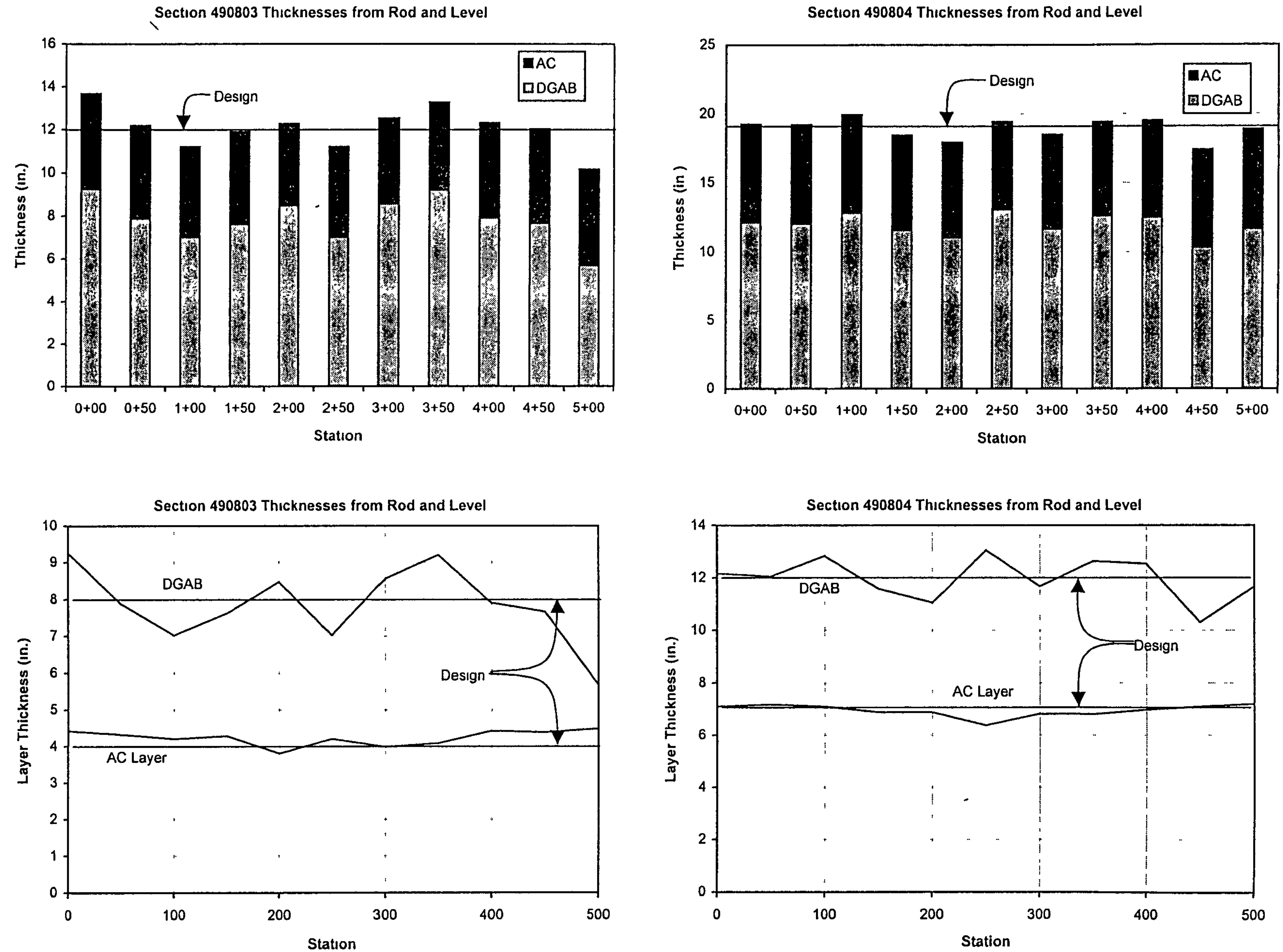


Figure 5. DGAB and AC layer thicknesses.

Table 10. AC gradation (Ignition furnace).

Sieve Size	Percent Passing by Sieve Size		
	Section 490803	Section 490804 (1)	Section 490804 (2)
3 in.	100	100	100
2 in.	100	100	100
1 1/2 in.	100	100	100
1 in.	100	100	100
3/4 in.	100	100	100
1/2 in.	100	100	99
3/8 in.	96	95	93
#4	70	71	65
#8	53	55	49
#30	31	32	27
#50	23	24	19
#200	6.7	7.5	4.4

Table 11. AC gradation (Abson recovered aggregate).

Sieve Size	Percent Passing by Sieve Size		
	Section 490803	Section 490804 (1)	Section 490804 (2)
3 in.	100	100	100
2 in.	100	100	100
1 1/2 in.	100	100	100
1 in.	100	100	100
3/4 in.	100	100	100
1/2 in.	100	100	100
3/8 in.	96	94	94
#4	66	67	67
#10	46	46	46
#40	25	24	24
#80	13	14	13
#200	5.1	5.3	4.9

Table 12. AC mix design summary (Hveem method).

Asphalt Type	PG 58-34; Conoco INC, Houston, Texas
Asphalt Percent	5.5
Density at Optimum AC (pcf)	141.5
Maximum Density, T209 (pcf)	148.9
Percent Air Voids	5
Percent VFA	67.7
Percent VMA	15.5
Mixing Temperature	280-300
Admixture and Percent	Lime; 1%

Table 13. AC loose paving thicknesses and placement temperatures.

Section	Lift		Nominal Thicknesses (in)	Laydown Temperature (F)
490803	1	Mean	2.6	252
		S.D.	0.32	36.5
		Max	3.5	259
		Min	2	246
	2	Mean	2.7	250
		S.D.	0.11	36.5
		Max	2.8	253
		Min	2.5	244
490804	1	Mean	3.2	244
		S.D.	0.48	40.1
		Max	4.5	252
		Min	2.5	235
	2	Mean	2.6	248
		S.D.	0.16	42.2
		Max	3	255
		Min	2.5	241
	3	Mean	2.8	255
		S.D.	0.13	34.8
		Max	2.8	259
		Min	3	253

Table 14. AC compaction data on completed surface.

Section	Date	C/L Ref.	Station	In-Situ Density (pcf)
490803	10/16/97	6' Rt.	53+50	134.6
			55+00	135.9
			56+50	138.5
490804	10/16/97	6' Rt.	45+50	135.8
			47+00	135.8
			48+50	135.2

Table 15. AC compacted thickness measurements.

Section	Minimum Thickness (in.)	Maximum Thickness (in.)	Average Thickness (in.)	Specified Thickness (in.)	Standard Deviation (in.)
490803	2.3	5.4	4.2	4	0.45
490804	6.2	7.4	6.9	7	0.28

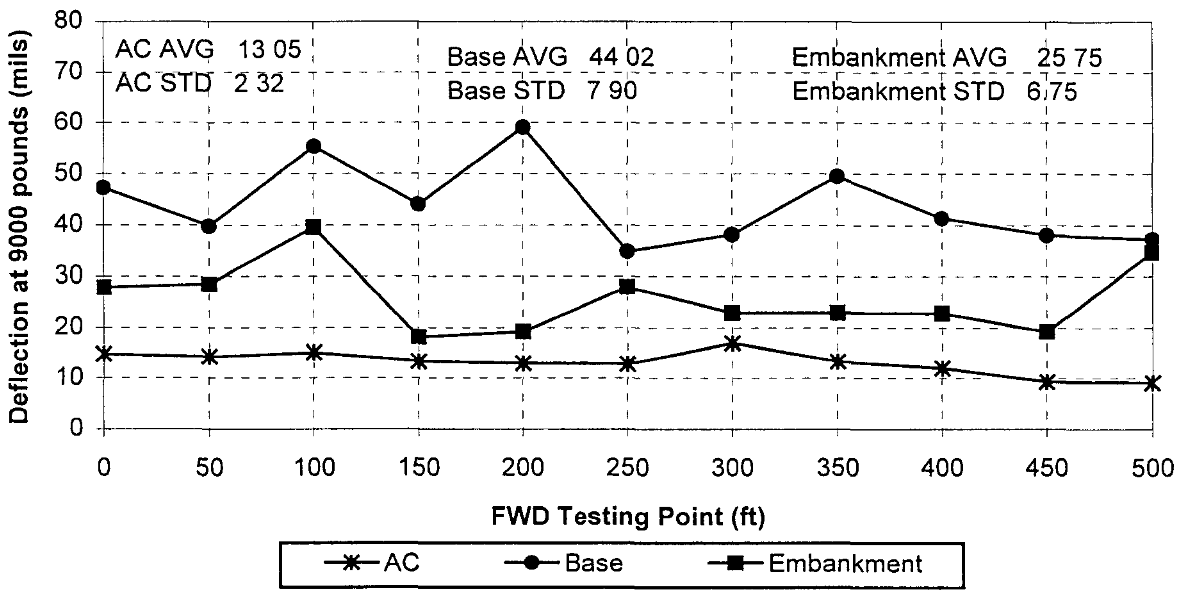


Figure 6. Section 490803 FWD deflections at sensor 1 (Midlane).

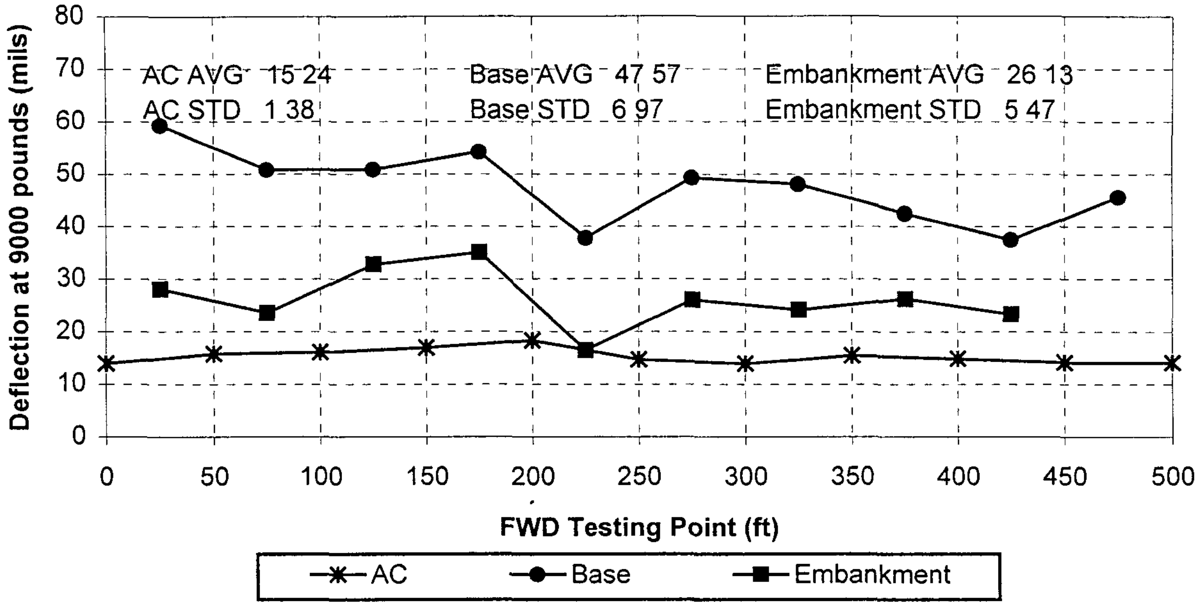


Figure 7. Section 490803 FWD deflections at sensor 1 (Wheelpath).

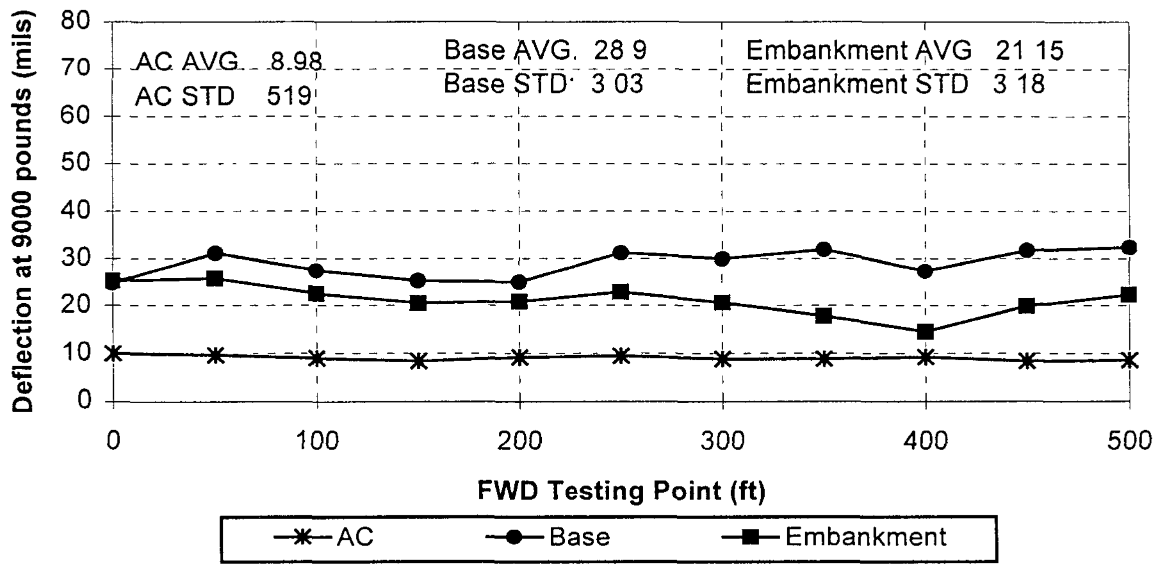


Figure 8. Section 490804 FWD deflections at sensor 1 (Midlane).

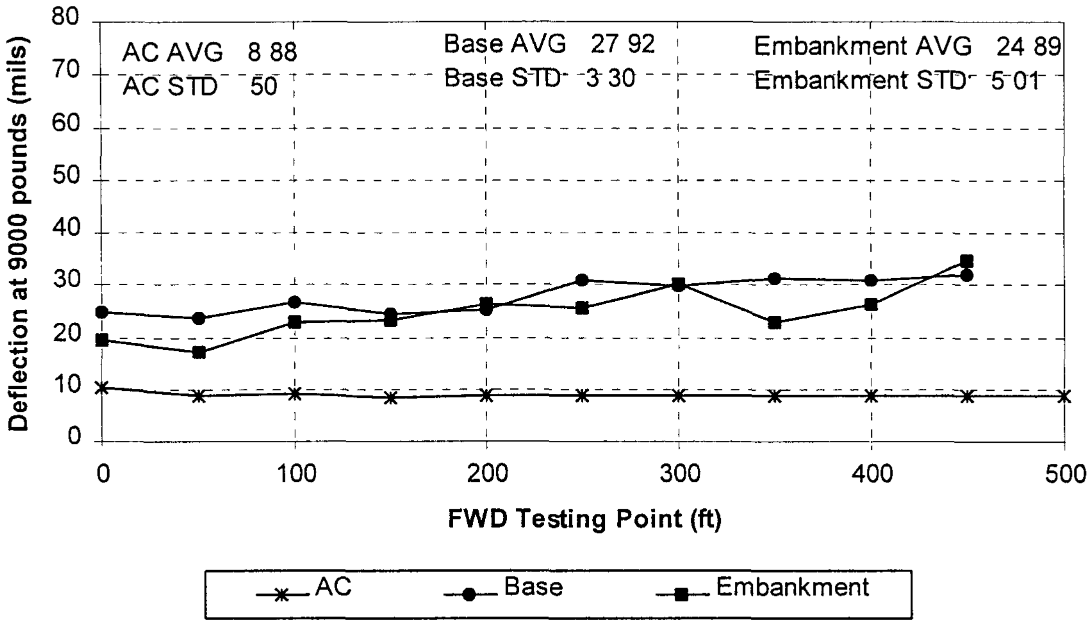


Figure 9. Section 490804 FWD deflections at sensor 1 (Wheelpath).

Paving of the test sections did not begin until September 30, 1997. It was originally scheduled for late July, but there were a number of problems producing an acceptable mix design. These were primarily related to difficulties with the aggregate, and eventually four different aggregates were used to produce the final aggregate blend, which had a moisture content of 4.5%. After the first lift was placed, approximately two weeks passed while Central Federal Lands performed tests on the mix to make sure its stability was within acceptable limits. There were concerns that the mix had too high an asphalt content and may have to be removed. This turned out not to be the case, and paving operations began again on October 16, 1997.

The asphalt concrete hot mix was produced in the Fitzgerald pit near the crusher (Photos 12 and 13, Appendix A). The plant was a 1985 Hetherington and Burner Mobil 50 pug mill that was modified and upgraded to current industry standards. It had an Astec 6-Pack silo and a maximum production rate of 300 tons/hr. The belly dump trucks were loaded to 26 tons per truck at approximately 5 minute intervals. The trucks took about 15 minutes to haul the AC to the roadway where they emptied their loads at grade in a windrow (Photo 14, Appendix A). A Blaw-Knox PF 5510 paver, utilizing a Barber-Greene B6650 pick-up machine, laid the AC (Photo 15, Appendix A). The breakdown roller was an Ingersoll-Rand DD-110 double drum vibratory roller (Photo 16, Appendix A).

In observing paving activities prior to reaching the test sections it was apparent that the paving crew was inexperienced, which led to a number of potential concerns with the paving operation. These are listed as follows:

- The pickup was not picking all the material up (Photo 18, Appendix A)
- There was no screed man
- The paver operator for the first lift was replaced for subsequent lifts
- The screed extensions were not aligned
- The pneumatic roller was picking up material
- The vibratory roller was filled with water on the freshly paved mat and would stop at the paver during breaks in the paving operation
- The roller was operating in vibratory mode over the longitudinal joint

The mix appeared to be very forgiving, however, so it is likely that despite all the problems it will perform very well.

IV. DETAILED ASPHALT CONSTRUCTION

This section highlights the paving of each section individually.

SECTION 490803

Paving of the first lift began at approximately 12:30 PM on September 30, 1997. The ambient air temperature was 70°F. The lift was placed on the prime coat covering the aggregate base and began at the start of the project, approximately one mile from the start of the test section. The weather was clear and warm. There were no stops in the paving operation until a 15 minute break was taken at station 5+00 to allow the rollers to catch up with the paver. Paving was completed for this lift at 1:02 PM. The mat was placed in a 2.6 inch loose lift with an average laydown temperature of 252°F. The temperature was about 194°F by the time the intermediate roller reached the mat. The paving width was 15 feet 6 inches.

Paving of the top lift began at 4:25 PM on October 16, 1997. The ambient air temperature was 69°F. There was a 30 second pause at 0+60, and no other interruptions until the pass was completed at station 6+00 at 4:40 PM. The mat was placed in a 2.7 inch loose lift with an average laydown temperature of 252°F.

SECTION 490804

Paving of the first lift began at 1:02 PM on September 30, 1997. The ambient air temperature was 71°F. The lift was placed on the prime coat covering the aggregate base and began at the start of the project. The paving crew began transitioning the lift thickness at station –1+00. The weather was clear and warm. There was a 4 minute pause at station 0+30 to take samples from the windrow, a 3 minute stop at station 0+80 to check the screed and a 10 minute break at station 4+40 to wait for the trucks. Paving was completed at station 6+00 at 1:48 PM. It was necessary to do some raking on centerline from stations 1+15 to 1+20, and there was a drain location around station 4+00. The mat was placed in a 3.1 inch loose lift with an average laydown temperature of 252°F. The paving width was 15 feet 6 inches.

Paving of the second lift began at 11:35 AM on October 16, 1997. The weather was quite cool (60°F) and cloudy, but there was no precipitation during paving (although there was slightly less than an inch of rain between the paving of the bottom lift on September 30 and paving of the second lift). Paving began at station –1+00 and ended at station 5+50 at 11:57 AM. The mat was placed in a 2.6 inch loose lift with an average laydown temperature of 248°F.

Paving of the top lift began at 4:40 PM on October 16, 1997. The ambient air temperature was 69°F. There was a 2 minute pause at station 1+00, and a 10 minute break at station 4+20 (while the breakdown roller was parked on the fresh mat at the paver). The mat was placed in a 2.8 inch loose lift with an average laydown temperature of 255°F.

V. SUMMARY

Construction of the Utah SPS-8 project began in June 1996 with subgrade preparation. In July 1996, an embankment layer was placed on the finished subgrade to an average depth of 57 inches. Due to the large percentage of rocky material in both the subgrade and embankment layers, Shelby tubes and complete shoulder augers were not obtained. A base course was placed in September of 1996, which was covered with a prime coat and left for the winter.

In the spring of 1997, there were a number of locations that needed repair. The sections had been covered in snow for the majority of the winter, and there were a number of potholes and soft spots throughout the project. Repairs were made to the test sections as well as the rest of the Wolf Creek project, and materials sampling of the base material took place July 10, 1997. Final base thicknesses for the two sections were 7.8 inches for 490803 and 12 inches for 490804.

The contractor had a lot of trouble producing an acceptable mix design, and for this reason paving of the test sections did not begin until September 30, 1997. Due to concerns over an excessive asphalt content in the first lift placed, paving operations were halted until October 16, 1997. It was found that the increased asphalt content did not put the stability of the mix out of specifications, but only put the mix at a lower pay factor. Final thicknesses for the asphalt layer were 4.2 inches for section 490803 and 6.9 inches for section 490804.

DEVIATIONS FROM SPECIFICATIONS

The specifications require a minimum of 50% DGAB retained (max. 50% passing) on the No. 4 sieve. From the three samples taken from the DGAB layer (Table 7) both sample 490803 and 490804(1) fail this criteria with 15% and 42% retained, respectively. Sample 490804(2) meets the specification with 52% retained.

The specifications state a maximum allowable deviation of 0.04 ft (0.5 in.) from design DGAB thickness. The DGAB layer for both sections fail this criteria with deviations of 3.3 in. and 2.2 in. Average thicknesses of 7.8 in. for 490803 and 12.0 in. for 490804 do meet the specification.

The specifications for the asphalt concrete require a minimum 60% retained (max. 40% passing) on the No. 4 sieve. All three samples failed this criteria. The aggregate extracted using an ignition furnace only had 30%, 29%, and 35% retained on the No. 4 sieve for sections 490803, 490804(1), and 490804(2), respectively. The aggregate extracted using the Abson recovered aggregate only had 34%, 33%, and 33% retained on the No. 4 sieve for sections 490803, 490804(1) and 490804(2), respectively.

The specifications state a maximum allowable deviation of 0.25 in. from design AC thickness. The AC layer for both sections fail this criteria with deviations of 1.4 in. and 0.8 in. Average thicknesses of 4.2 in. for 490803 and 6.9 in. for 490804 do meet the specification.

As stated in the *Project Description* section of this report, the project, as nominated, was considered to have a fine subgrade. Testing performed later indicated that the subgrade was in actuality coarse. Although this is not a deviation from the specifications, it is a deviation from the assumptions of the initial conditions of the project and consequently deserves special mention in this section.

APPENDIX A

PHOTOGRAPHS OF UTAH SPS-8 CONSTRUCTION

Photo 1.	Weather Station Install (11/18/96)
Photo 2.	Subgrade Preparation
Photo 3.	Subgrade Sampling
Photo 4.	Irrigation Runoff Onto Subgrade
Photo 5.	Embankment Material
Photo 6.	Embankment Nuclear Density Testing
Photo 7.	Shoulder Probe of Embankment
Photo 8.	CAT Grader (7/10/97)
Photo 9.	Dynapac Compactor (7/10/97)
Photo 10.	Dense Graded Aggregate Base (11/18/96)
Photo 11.	Dense Graded Aggregate Base (7/10/97)
Photo 12.	Crusher and Hot Mix Plant (Fitzgerald Pit)(10/16/97)
Photo 13.	Crusher (Fitzgerald Pit)(10/16/97)
Photo 14.	Paving Windrow (10/16/97)
Photo 15.	AC Paving and Paver (10/16/97)
Photo 16.	Roller Operations (10/16/97)
Photo 17.	AC Core (10/16/97)
Photo 18.	Bottom Lift Paving (9/30/97) – Closeup of AC pick-up machine
Photo 19.	Bottom Lift Paving (9/30/97) – Closeup of Screed
Photo 20.	Bottom Lift Paving (9/30/97) – Closeup of Ski

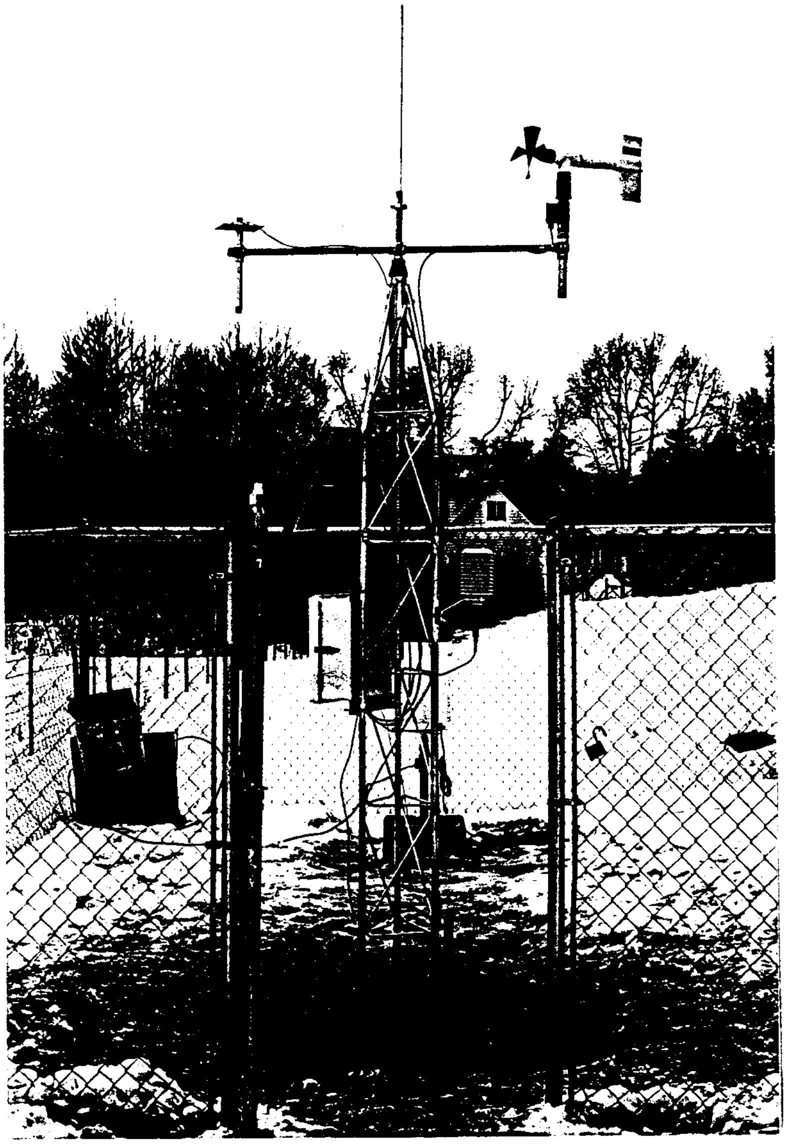


Photo 1. Weather Station Install (11/18/96).

Photo 2. Subgrade Preparation

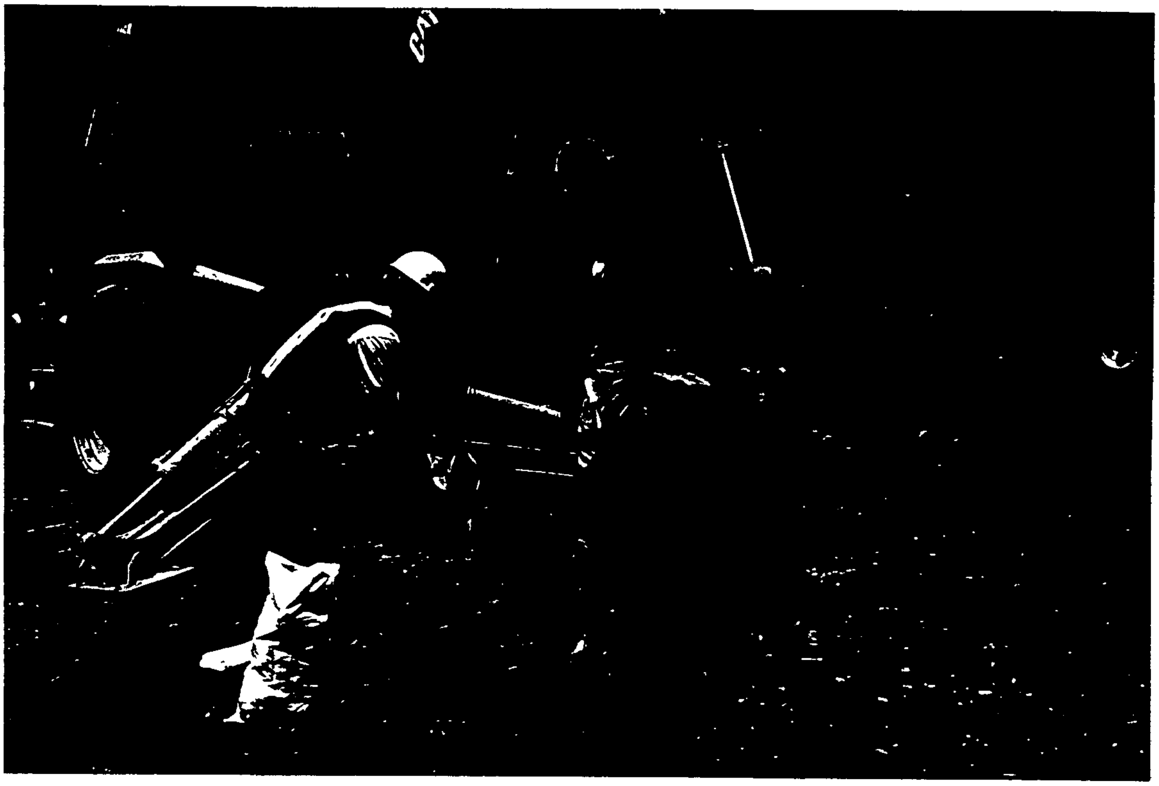


Photo 3. Subgrade Sampling

Photo 4. Irrigation Runoff Onto Subgrade

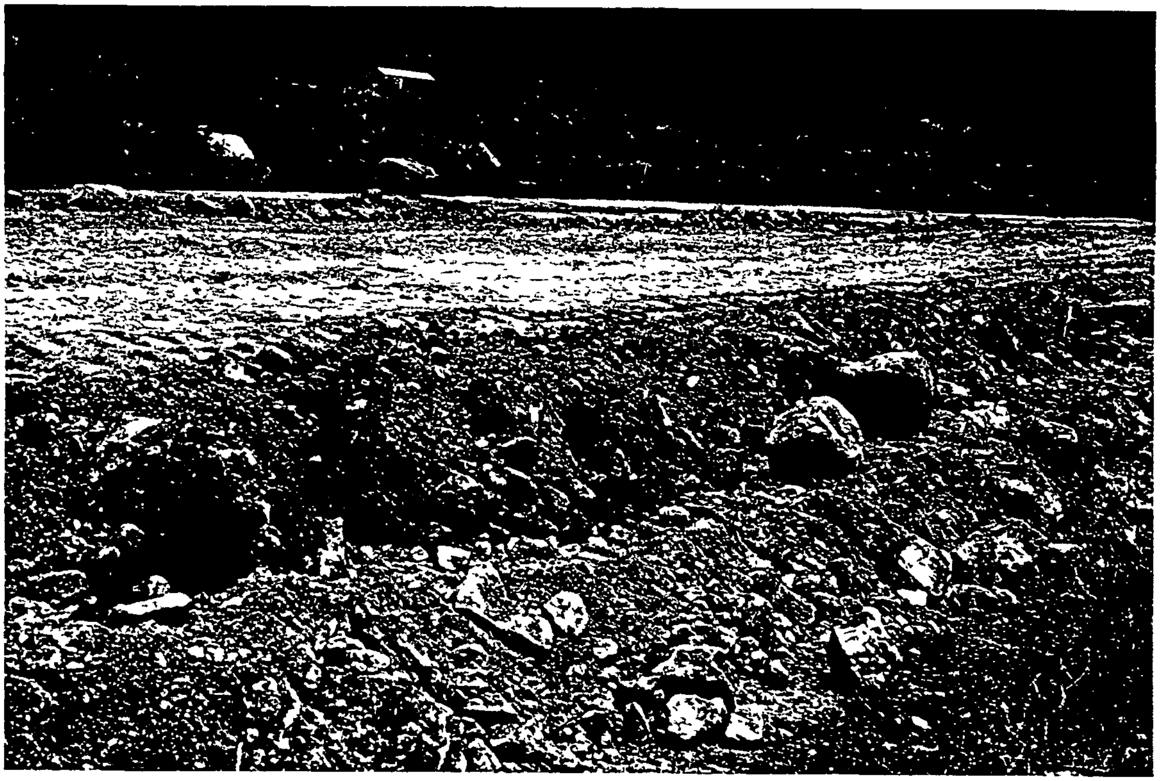


Photo 5. Embankment Material

Photo 6. Embankment Nuclear Density Testing

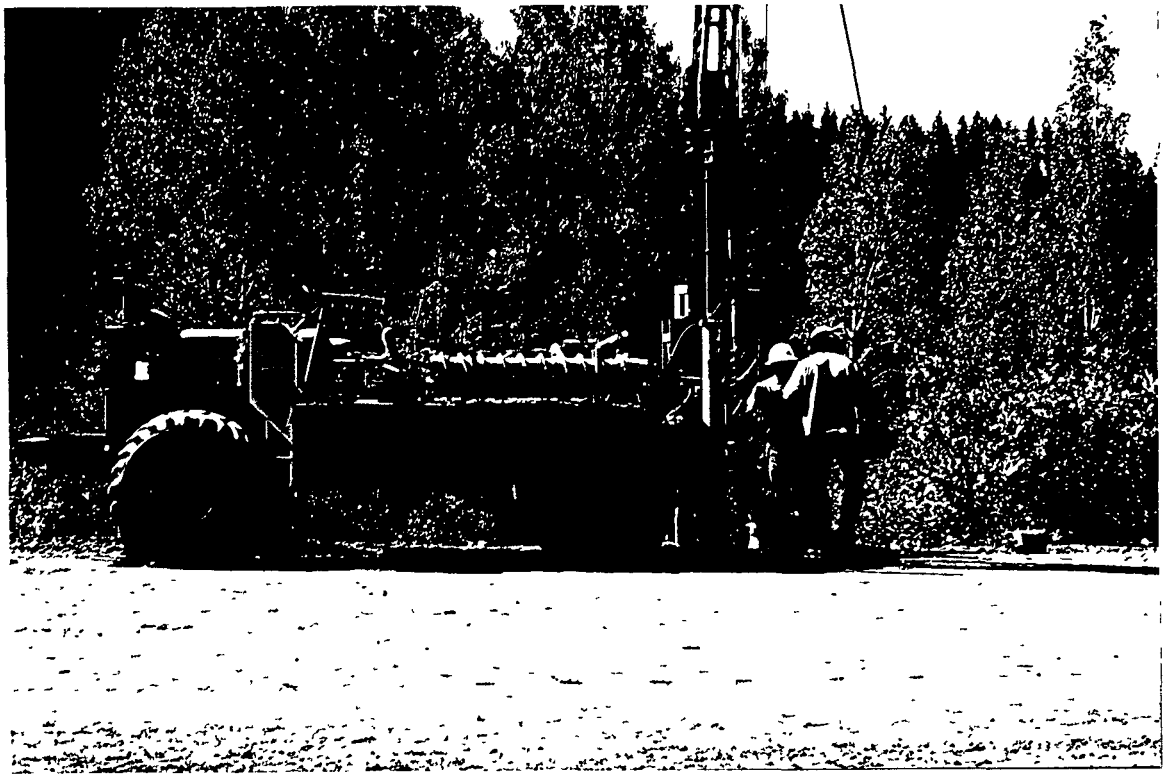


Photo 7. Shoulder Probe of Embankment

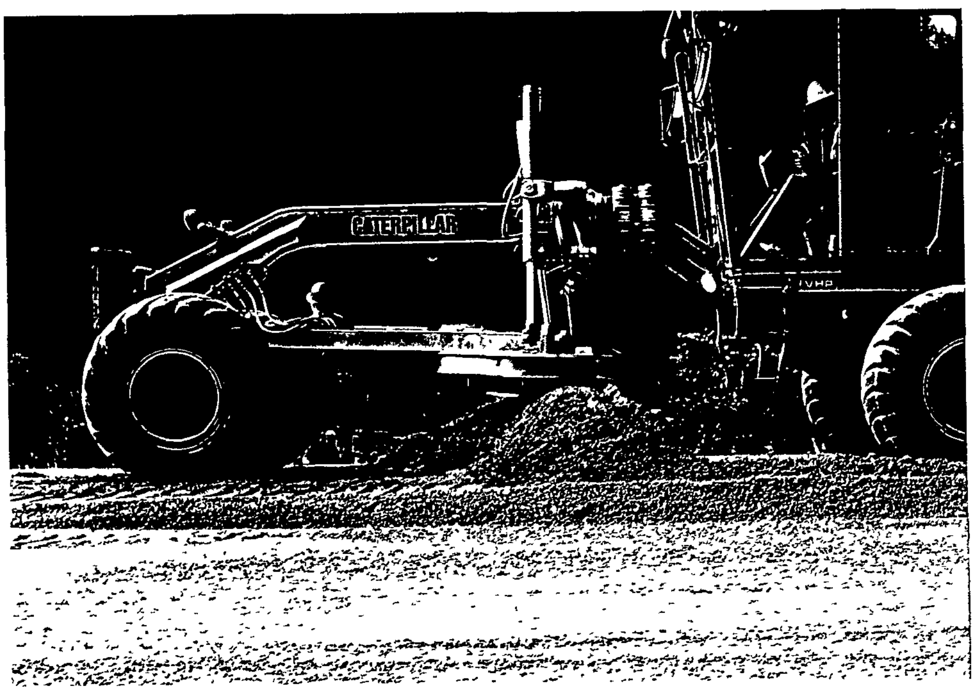


Photo 8. CAT Grader (7/10/97)

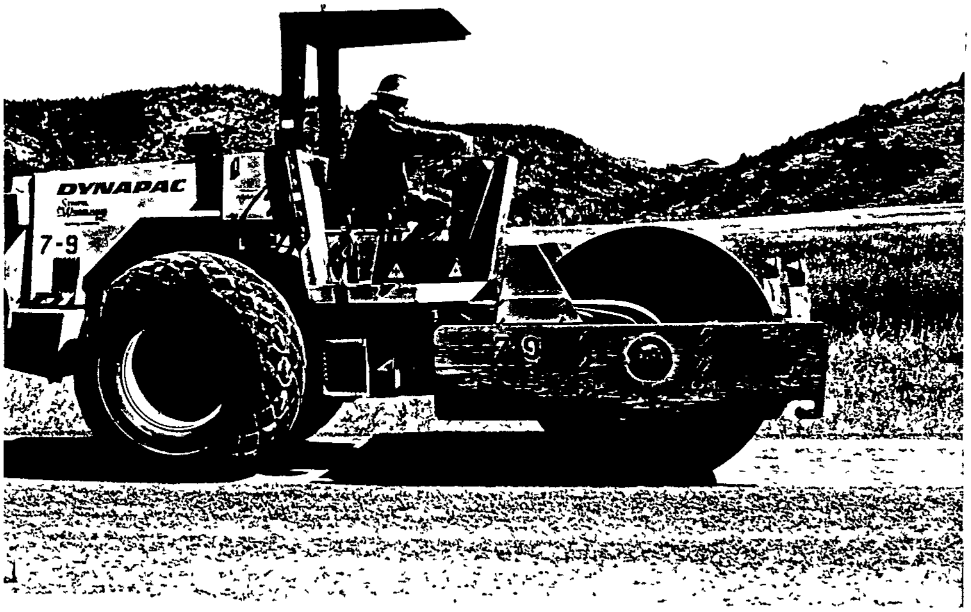


Photo 9. Dynapac Compactor (7/10/97)

Photo 10. Dense Graded Aggregate Base (11/18/96)

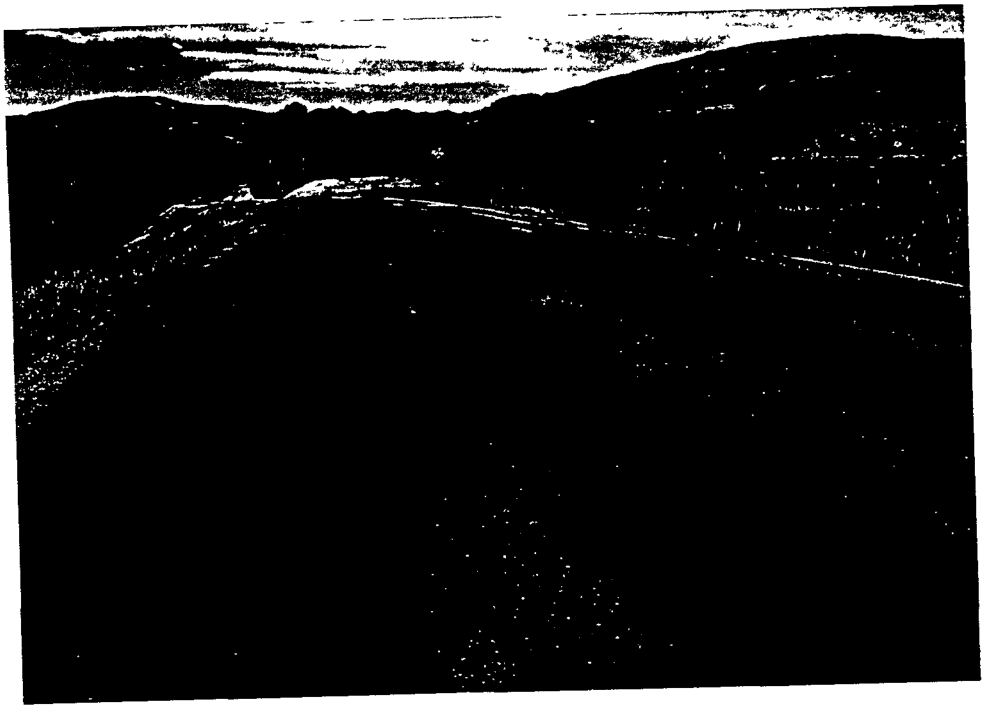


Photo 11. Dense Graded Aggregate Base (7/10/97)

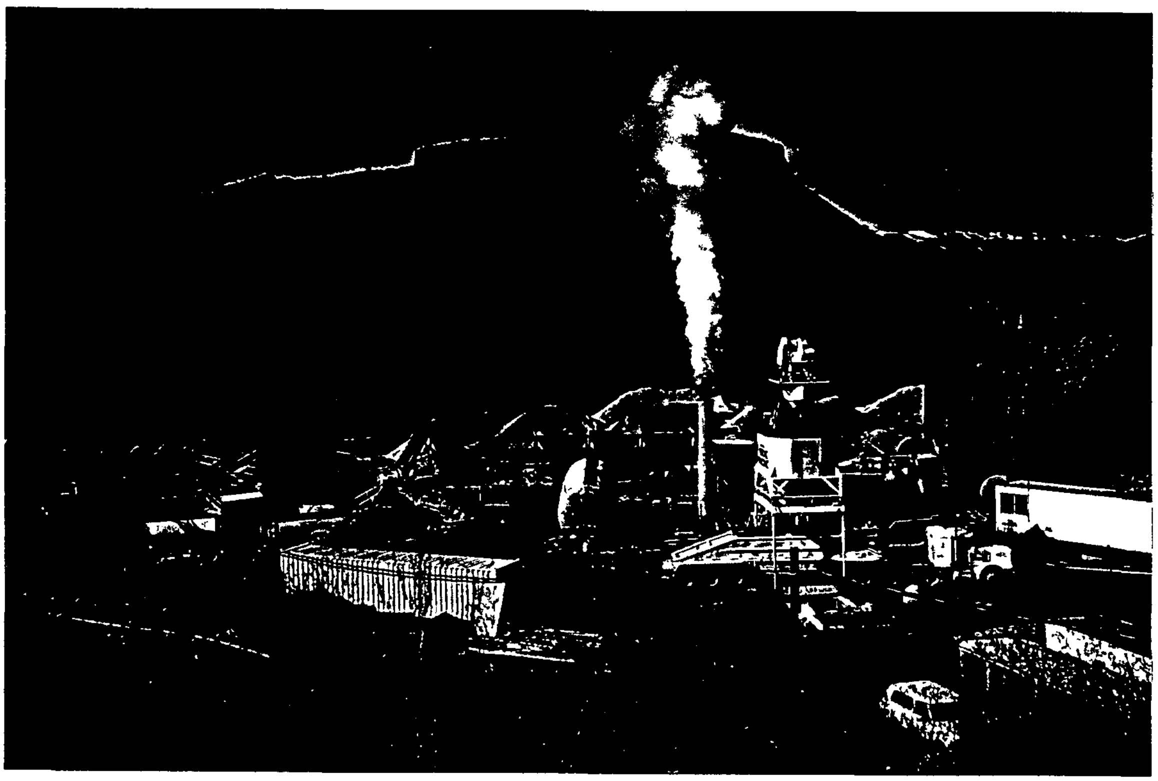


Photo 12. Crusher and Hot Mix Plant (Fitzgerald Pit)(10/16/97)

Photo 13. Crusher (Fitzgerald Pit) (10/16/97)

Photo 14. Paving Windrow (10/16/97)

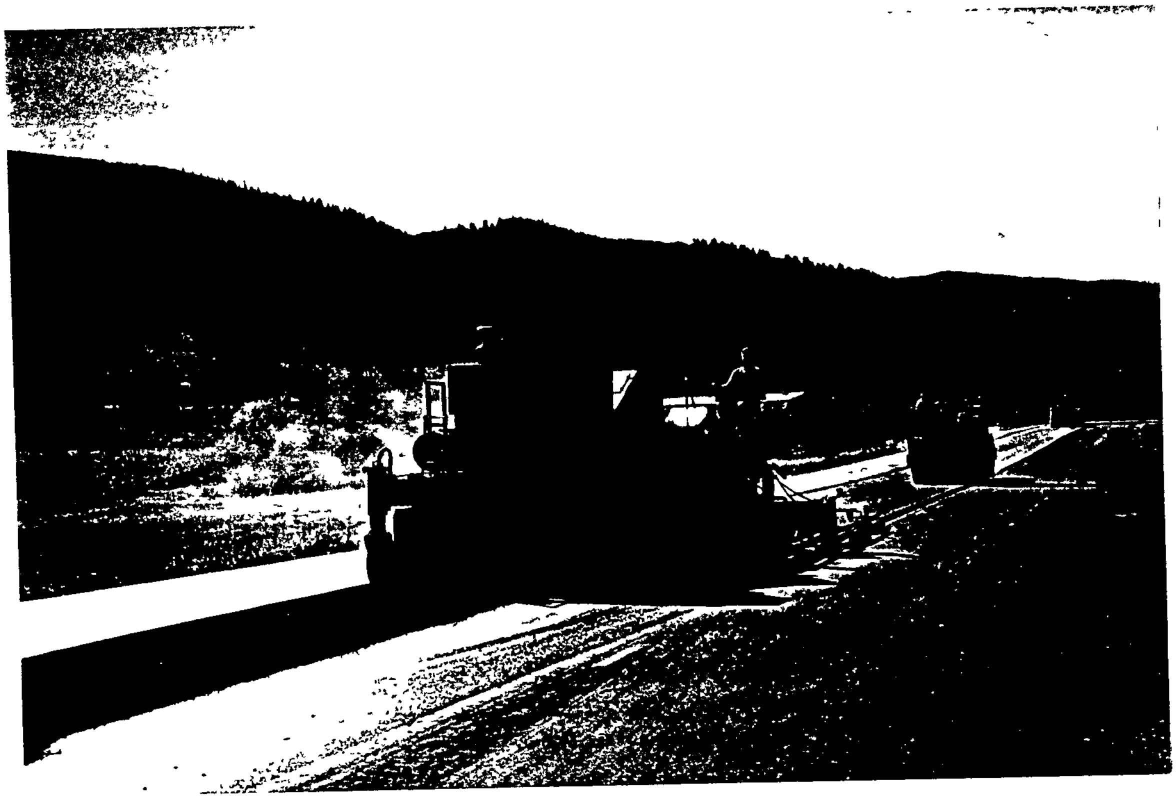


Photo 15. AC Paving and Paver (10/16/97)

Photo 16. Roller Operations (10/16/97)

Photo 17. AC Core (10/16/97)

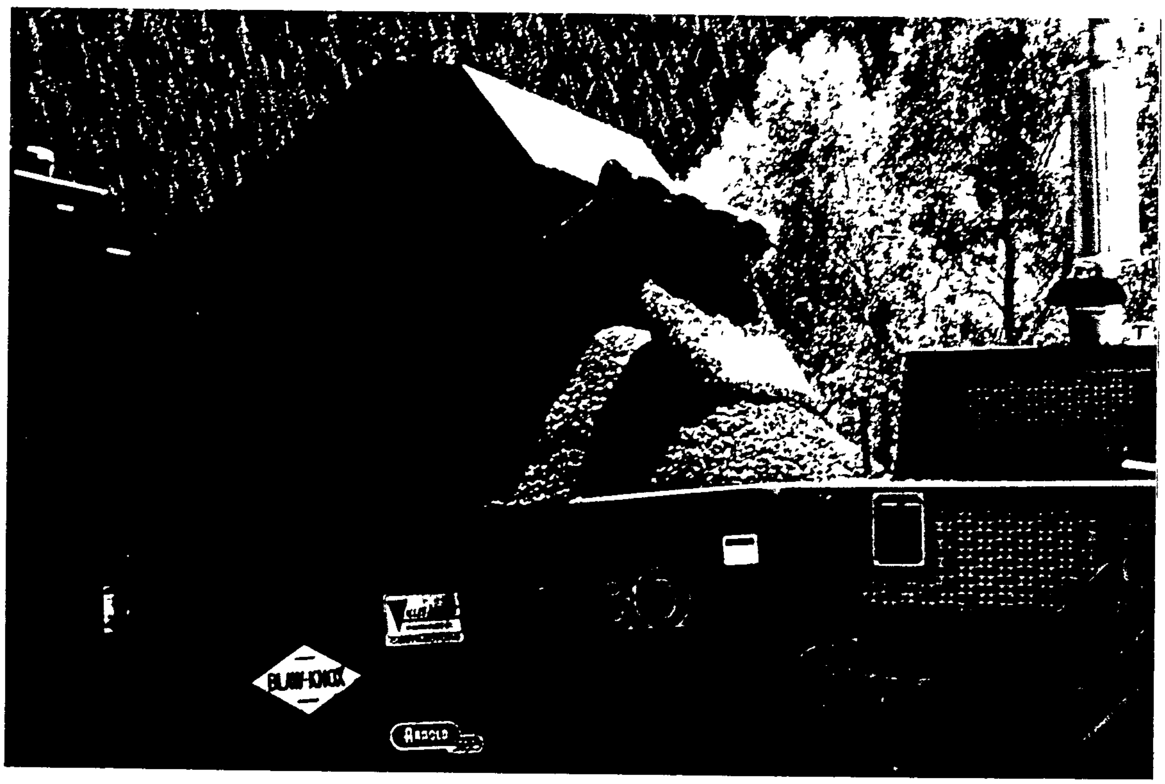


Photo 18. Bottom Lift Paving (9/30/97) – Closeup of AC Pickup

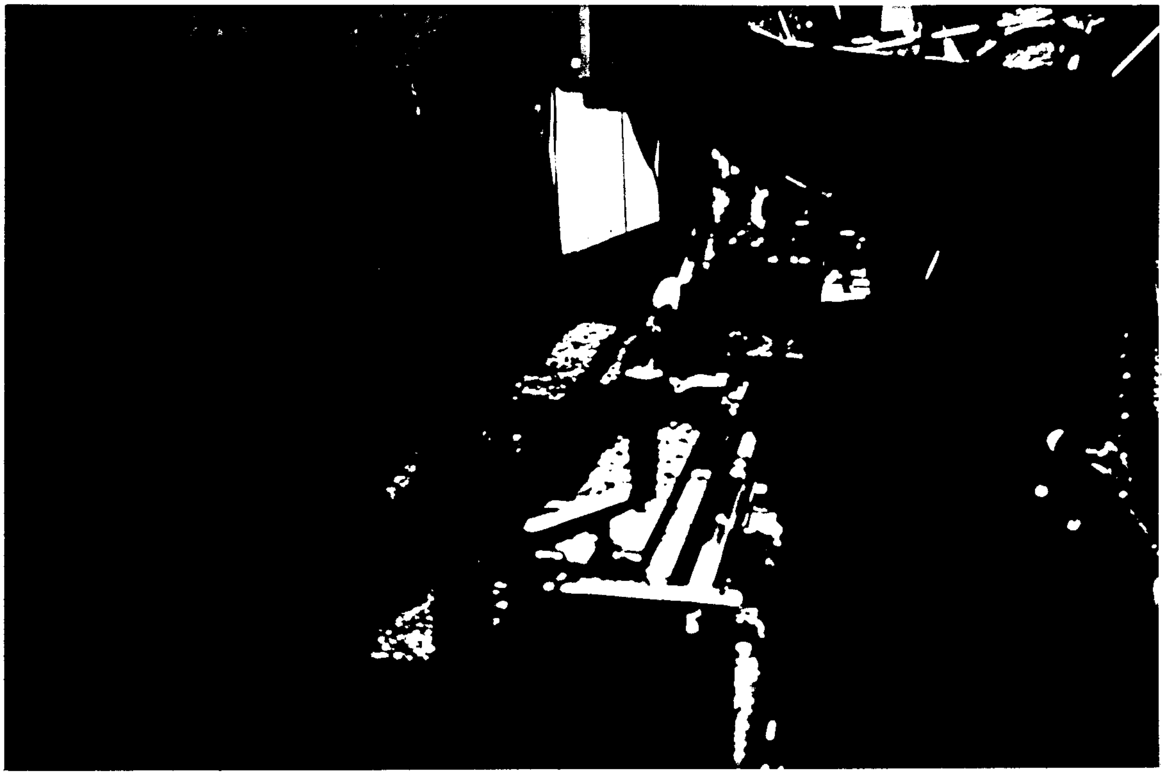


Photo 19. Bottom Lift Paving (9/30/97) – Closeup of Screed

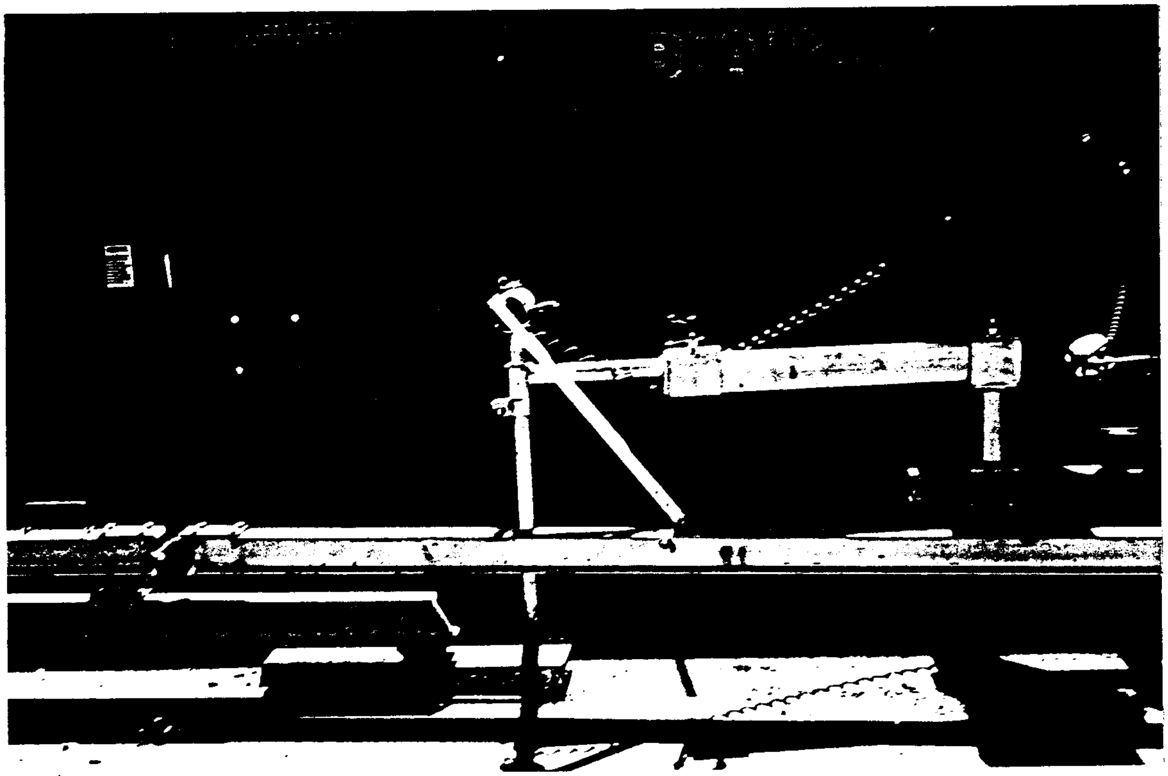


Photo 20. Bottom Lift Paving (9/30/97) – Closeup of Ski

APPENDIX B

MIX DESIGN – AC SURFACING

ATTACHMENT A

FE :RAL HIGHWAY ADMINIS.RATION
Central Federal Lands Highway Division

REPORT OF ASPHALT CONCRETE MIX DESIGN

:t: UTAH PFH & PLH 5-2(3) WOLFCREEK ROAD
itted By: NORMAN MERRILL
Date Reported: 9/18/97
Aggregate Source: Z-ROCK PIT & BINGGELE PIT
Design Type: HOT ASPHALTIC CONCRETE PAVEM
Mix Class: B Grading: D Asphalt Cement Source and Grade: CONOCO INC, HOUSTON, TEXAS, PG-58-34

							Combined As Received	As Built	Specification	Target Value	(D)
Lab Number		97-613-AGG	97-614-AGG	97-615-AGG	97-616-AGG		97-630-AGG				
Field Number											
Description		COARSE AGGREGATE	CRUSHED FINES	WASHED FINES	INTERMEDIATE CHIPS						
Bin Combination (%)		35.3	20.2	29.3	15.2		WITH LIME →				
1"	25.0 mm	BINGGELE	PIT →	Z-ROCK PIT	→						
3/4"	19.0 mm	100 (100)					100	100	100		
1/2"	12.5 mm	95 (99)	(100)	(100)	(100)		98 (100)	98	97-100		
3/8"	9.5 mm	53 (58)	100	100	100		83	83			
#4	4.75 mm	6 (2)	97 (97)	99 (99)	55 (52)		59 (57)	58	57-69	58	6
#8	2.36 mm	5 (1)	77 (74)	88 (79)	7 (9)		45 (40)	45	41-49	43	6
#16	1.18 mm										
#30	600 um	5 (1)	58 (53)	38 (39)	3 (5)		26 (23)	26	22-30	25	4
#40	425 um	4	52	31	3		23	23			
#50	300 um	4 (1)	44 (42)	25 (27)	3 (5)		19 (18)	19	13-21	19	3
#100	150 um										
#200	75 um	1.7 (0.8)	13.6 (11.5)	4.7 (3.3)	1.3 (2.6)		5.0 (4.0)	5.8	3-8	4.9	2
Liquid Limit		NT	NV	NV	NT		NV	NV			
Plasticity Index		NT	NP	NP	NT		NP	NP			

Design Parameters w/LIME

...n AC % by Total Mix Weight:	5.5
...:	36
Density at Optimum AC (PCF):	141.5
Maximum Density, T209 (PCF):	148.9
Air Voids (%):	5.0
VFA (%):	67.7
VMA (%):	15.5
Mixing Temperature (F):	280-300°
Average Film Thickness (Microns):	9.1
Dust - Asphalt Ratio:	0.9
Antistrip (%, Type):	LIME 1.0

Moisture Susceptibility IMMERSION/COMPRESSION

Additive Type	NONE	LIME		
AC (%)	5.0	5.0		
Additive (%)	-0-	1.0		
Wet Strength (PSI)	84	199		
Dry Strength (PSI)	171	212		
Strength Ratio (%)	49.1	93.9		
Average Air Voids (%)	9.0	7.9		
Average Density (PCF)	132.9	134.6		
Initial Saturation (%)	—	—		
Final Saturation (%)	113.0	84.7		
Initial Swell (%)	—	—		
Final Swell (%)	—	—		
Cracked Broken Aggregate (%)	—	—		
Uncoated Aggregate (%)	—	—		

Aggregate Quality

Los Angeles Abrasion, Grading C (%):	37
Sodium Sulfate Soundness (%):	
Fractured Faces, ONE OR MORE (%):	76
Durability Index, AASHTO FINE:	77
Sand Equivalent, REFEREE (CTTX):	64
Uncompacted FA Voids, Method C (%):	39.3
Flat, Elongated Particles, 1:5 Ratio (%):	1

Specific Gravity & Absorption

	+ #4	- #4	Combined
Apparent Specific Gravity	2.62	2.64	2.63
Bulk Specific Gravity	2.52	2.57	2.55
Absorption (%)	1.5	1.1	1.2
Effective Specific Gravity			*2.590

Distribution:
Materials 3 Copies
Project Engineer N. MERRILL
Construction D. ZAVETELL
Q.A. Engineer O. MARQUET...

Remarks: ( )-INDICATES CONTRACTORS RESULTS
* Effective Specific Gravity supplied by Western Colorado Testing Inc.

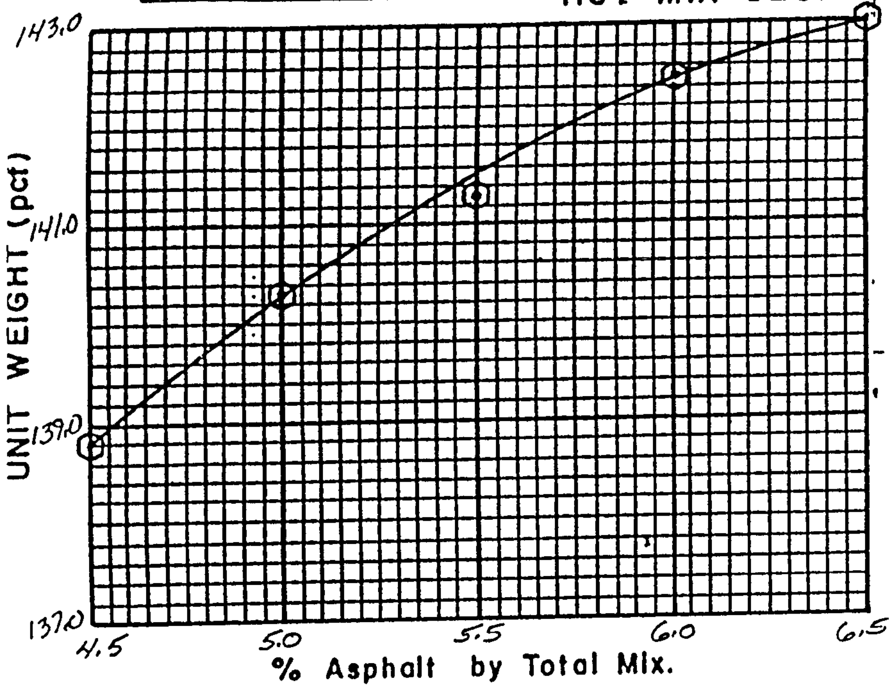
Reported by:
Alan M. Held for
Materials Specialist
Bob H. Welch, P.E.
Materials Engineer

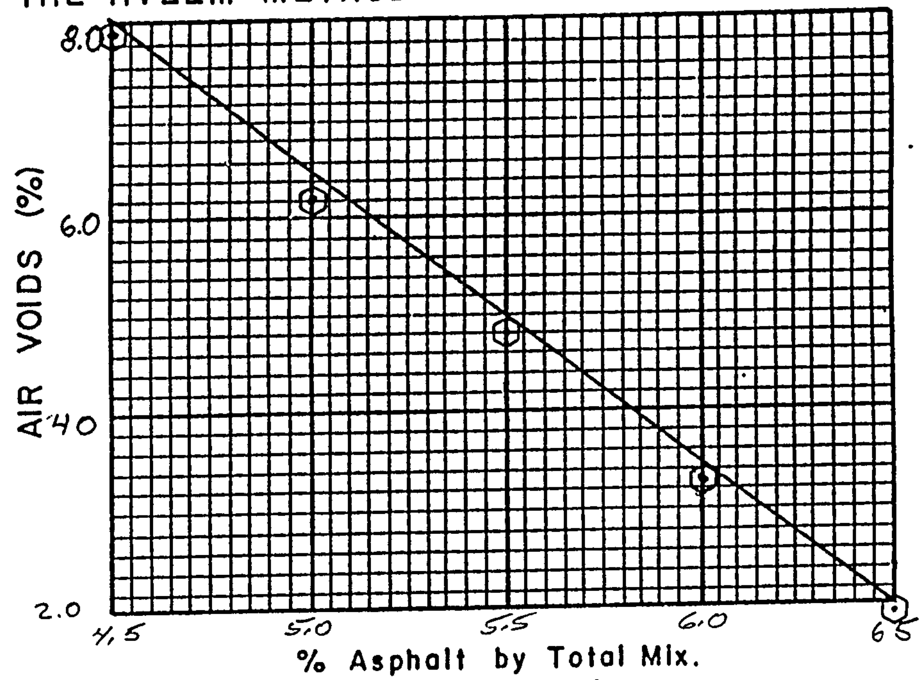
Project: UT PFH & PLH 5-2(3)
WOLF CREEK ROAD

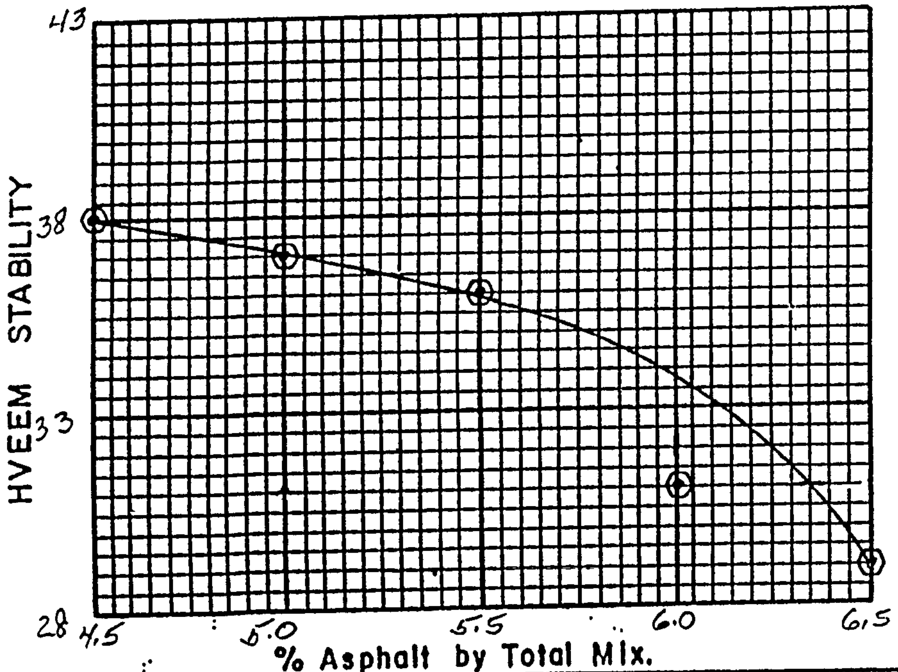
FEDERAL HIGHWAY ADMINISTRATION REGION 16

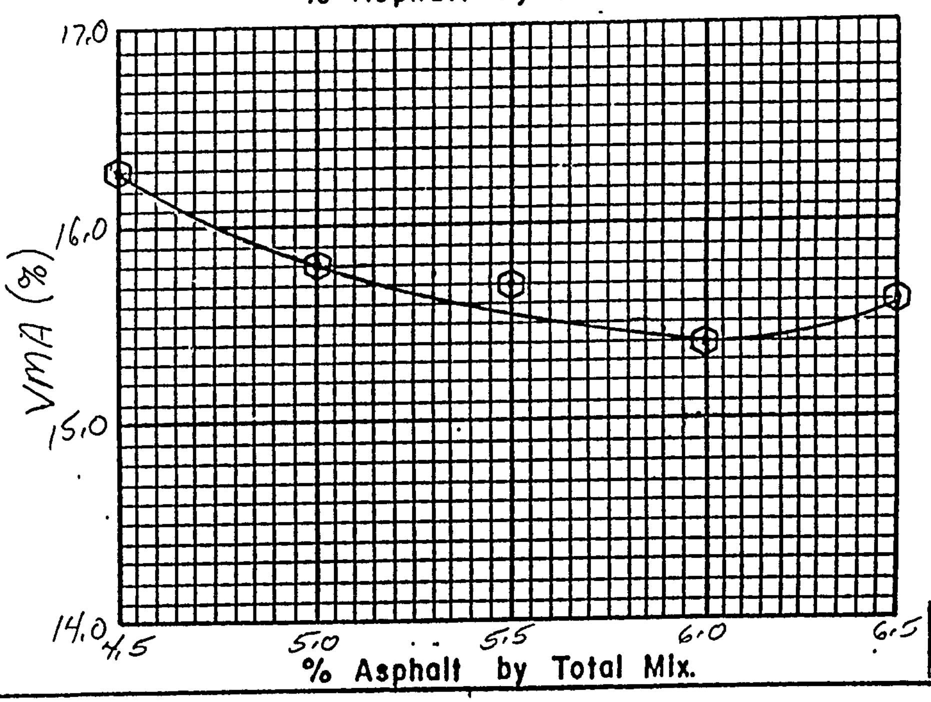
Lab. No: 97-0630-AGG
Date: 9/18/97

HOT MIX DESIGN BY THE HVEEM METHOD









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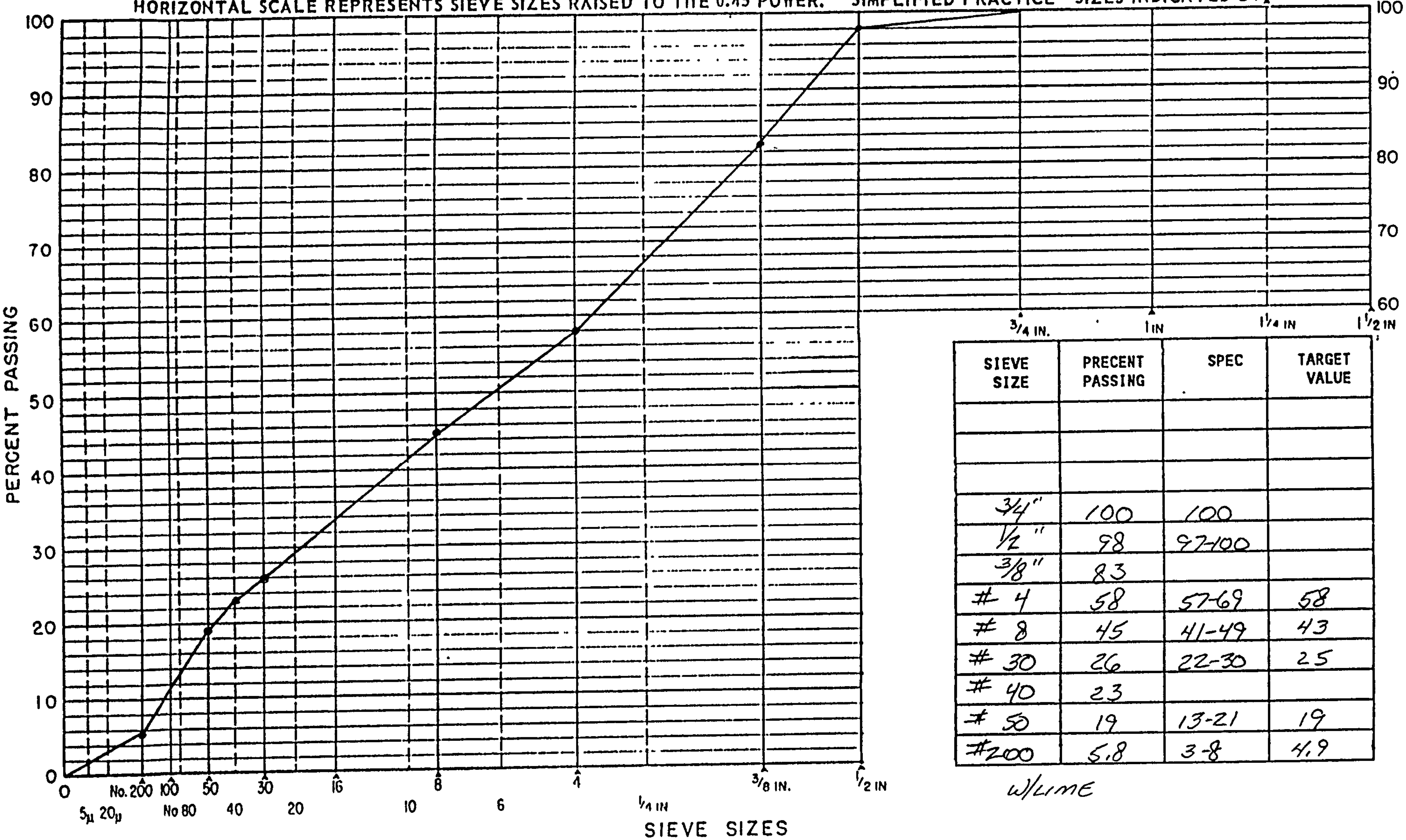
(. ·91)

FEDERAL HIGHW/ INISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

GRADATION CHART

HORIZONTAL SCALE REPRESENTS SIEVE SIZES RAISED TO THE 0.45 POWER. "SIMPLIFIED PRACTICE" SIZES INDICATED BY ▲



SIEVE SIZE	PRECENT PASSING	SPEC	TARGET VALUE
3/4"	100	100	
1/2"	98	97-100	
3/8"	83		
# 4	58	57-69	58
# 8	45	41-49	43
# 30	26	22-30	25
# 40	23		
# 50	19	13-21	19
#200	5.8	3-8	4.9

W/LIME

STATE	PROJECT NUMBER, NAME	LAB NUMBER	DATE	PREPARED BY
UTAH	UT PFH & PLH 5-2(3) WOLF CREEK ROAD	97-0630-AGG	9/11/97	PEG

TYPE, SOURCE, PRODUCER OF AGGREGATE	MATERIAL DESCRIPTION	ITEM	GRADING	CLASS
COARSE AGGREGATE & CRUSHED FINES BINGGELE PIT WASHED FINES & INTERMEDIATE CHIPS Z-ROCK PIT	HOT ASPHALTIC CONCRETE PAVEMENT	401	D	B

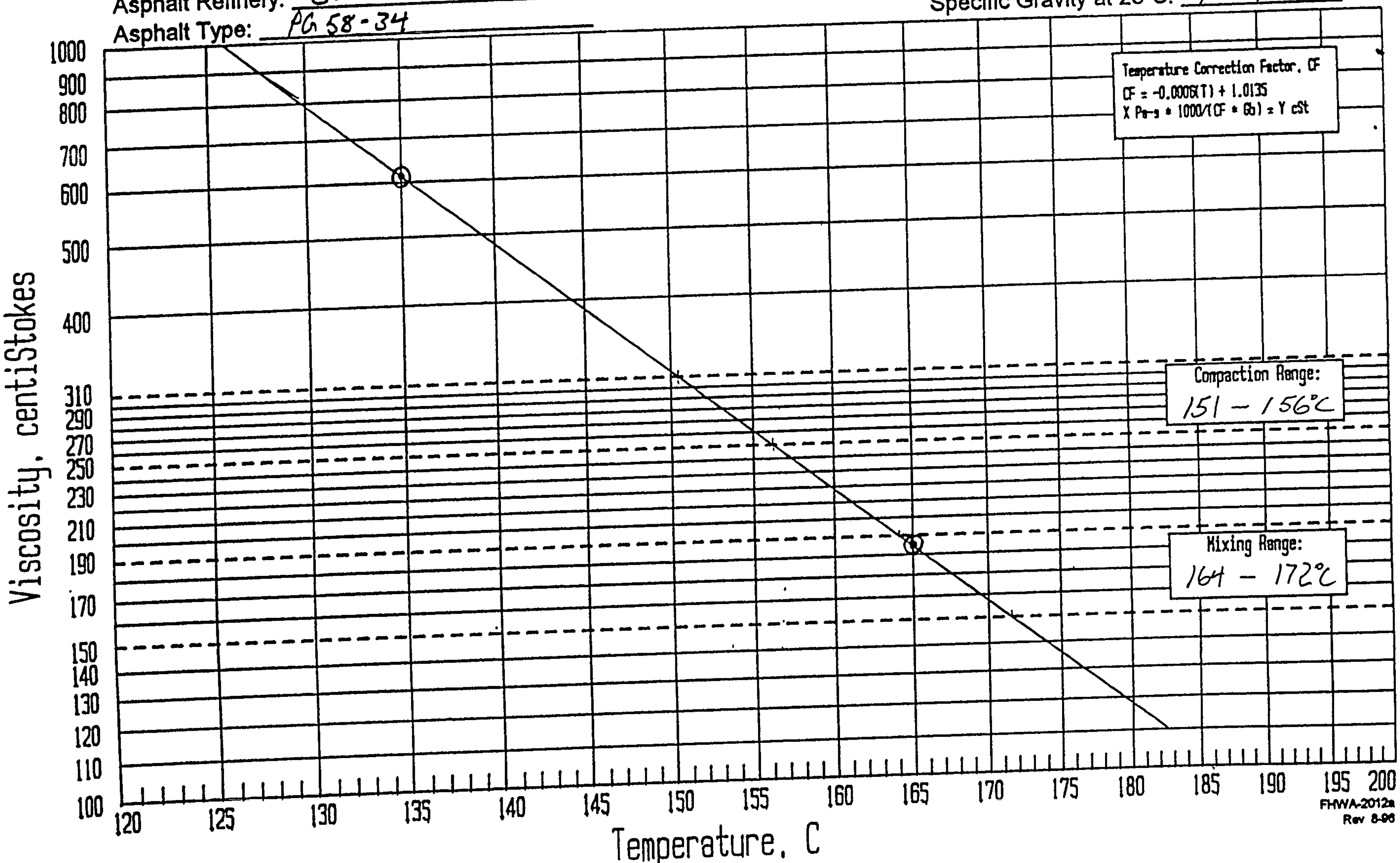
REMARKS

DEPARTMENT OI ANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL HIGHWAY ADMINISTRATION

TEMPERATURE VISCOSITY PLOT

State: UTAH
Project Number: PFH + PLH 5-2 (3)
Name: WOLF CREEK
Asphalt Refinery: CONOCO INC, HOUSTON, TX
Asphalt Type: PG 58-34

Lab No.: 97-436-PG Date: 8/5/97
Viscosity at 135 °C: 0.577 Pa·s
Viscosity at 165 °C: 0.174 Pa·s
Viscosity at ______ °C: ______ Pa·s
Specific Gravity at 25°C: 1.014



FHWA-2012a
Rev 8-96

FEDERAL HIGHWA ADMINISTRATION

Central Federal Lands Highway Division

SUMMARY OF TESTS ON PERFORMANCE GRADE ASPHALT CEMENT

Project: UT PLH & PFH 5-2(3) Wolf Creek Road

Date Reported: 8/05/1997

Asphalt Cement Type: PG 58-34 **Refinery:** Conoco Incorporated, Houston, Texas

Submitted By: Norm Merrill

Lab Number	970436				
Field Number	NA				
Invoice Number	NA				
Quantity Represented	NA				
Test Designation	Design				

TESTS ON ORIGINAL	Specifications						
	Minimum	Maximum					
Flash (COC) : C	230	---	230+				
TP48, Rotational Viscosity (135 C): Pa*s	---	3	0.577				
TP5, Dynamic Shear (58 C), G*/sin d:kPa	1.00	---	1.86				
Specific Gravity (25 C)	---	---	1.014				

RESIDUE TEST, RTFO ONLY							
Loss on Heating : %	---	1	0.37				
Dynamic Shear (58 C), G*/sin d : kPa	2.20	---	4.33				

RESIDUE TESTS, RTFO & PAV							
Dynamic Shear (16 C), G* x sin d : kPa	---	5000	847				
TP1, Creep Stiffness (-24 C), S. Max:MPa	---	300	161				
TP1, Creep Stiffness (-24 C), m-value	0.300	---	0.318				
TP3, Direct Tension (C) , Strain : %	---	---					
TP3, Direct Tension (C), Stress : MPa	---	---					
24 hr Hardening (C), Msrd. Stiffness	---	---					
24 hr Hardening (C), Estd. "m" slope	---	---					

Distribution:

Project Engineer	N. L. Merrill
Construction	D. Zanetell
Laboratory	3 copies
QA/QC Engineer	Rick Marquez

Remarks: After a temperature sweep was performed. the above asphalt was determined to be a PG 64.6 - 35.9.

Reported By: Alan Held

Bob H. Welch, P.E.
Materials Engineer

REV. 10/31/95
FHWA 16-229-A
SHRP_GEM.FRM

FEDERAL HIGHWAY ADMINISTRATION

Central Federal Lands Highway Division

SUMMARY OF TESTS ON PERFORMANCE GRADE ASPHALT CEMENT

Project: UT PLH & PFH 5-2(3) Wolf Creek Road **Date Reported:** 8/05/1997

Asphalt Cement Type: PG 58-34 **Refinery:** Conoco Incorporated, Houston, Texas **Submitted By:** Norm Merrill

Lab Number	970436				
Field Number	NA				
Invoice Number	NA				
Quantity Represented	NA				
Test Designation	Design				

TESTS ON ORIGINAL	Specifications						
	Minimum	Maximum					
Flash (COC) : C	230	---	230+				
TP48, Rotational Viscosity (135 C): Pa*s	---	3	0.577				
TP5, Dynamic Shear (58 C), G*/sin d:kPa	1.00	---	1.86				
Specific Gravity (25 C)	---	---	1.014				

RESIDUE TEST, RTFO ONLY							
Loss on Heating : %	---	1	0.37				
Dynamic Shear (58 C), G*/sin d : kPa	2.20	---	4.33				

RESIDUE TESTS, RTFO & PAV							
Dynamic Shear (16 C), G* x sin d : kPa	---	5000	847				
TP1, Creep Stiffness (-24 C), S. Max:MPa	---	300	161				
TP1, Creep Stiffness (-24 C), m-value	0.300	---	0.318				
TP3, Direct Tension (C) , Strain : %	---	---					
TP3, Direct Tension (C), Stress : MPa	---	---					
24 hr Hardening (C), Msrd. Stiffness	---	---					
24 hr Hardening (C), Estd. "m" slope	---	---					

Distribution:

Project Engineer	N. L. Merrill
Construction	D. Zanetell
Laboratory	3 copies
QA/QC Engineer	Rick Marquez

Remarks: After a temperature sweep was performed. the above asphalt was determined to be a PG 64.6 - 35.9.

Reported By: /s/ Alan Held

Bob H. Welch, P.E.
Materials Engineer

REV. 10/31/95
FHWA 16-229-A
SHRP_GEM.FRM

DEPARTMENT OF TRANSPORTATION

FEDERAL HIGHWAY ADMINISTRATION

CENTRAL FEDERAL LANDS HIGHWAY DIVISION

SHRP PERFORMANCE GRADE ANALYSIS

LAB NUMBER:	97-436-PG	**TESTED BY:**	R Duval	**REPORT DATE:**	02/09/98
PROJECT:	Utah PFH & PLH 5-2(3)	**SOURCE:**	Conoco Oil, Denver, CO	**TEST DATE:**	07/31/97

HANDLING AND SAFETY PROPERTIES

TEST	SPECIFICATION	TEST RESULT
Flash Point, COC, Deg C	Min 230 Deg C	230+
RTFO Mass Loss, Wt.%	Max 1 00	0 37%
Brookfield Viscosity, Pa s	Max 3	0 577

PRECISE SHRP GRADE
PG [illegible]

PRESSURE AGING VESSEL

TEMPERATURE	C =	100

VISCOSITY

BROOKFIELD @ 165 C, Pa*s =	0.174

SPECIFIC GRAVITY

SPECIFIC GRAVITY @ 25 C =	1.014

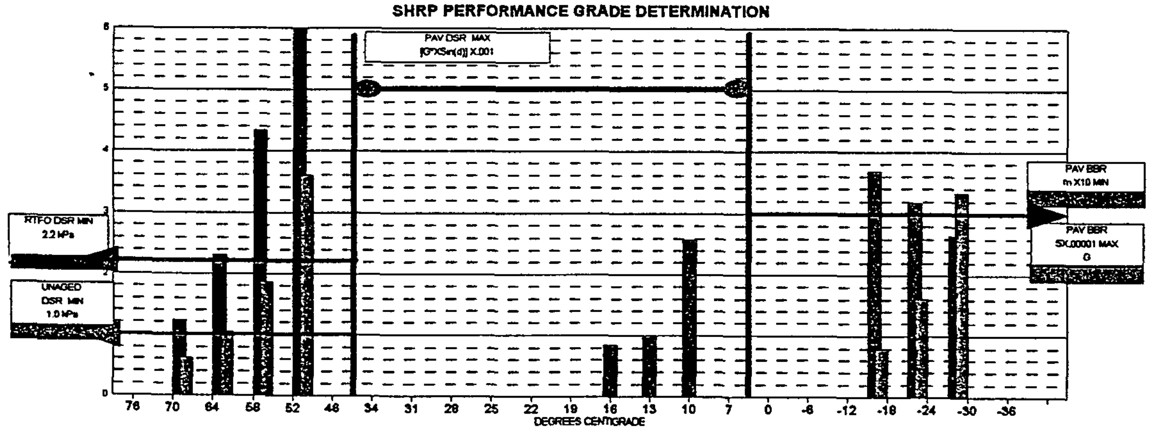
COMMENTS:

MIX PERFORMANCE PROPERTIES

TEST	DEG C	UNAGED G*/Sin(d) MIN 1.0 kPa	RTFO G*/Sin(d) MIN 2.2 kPa	PAV USING RTFO RESIDUE G*XSin(d) MAX 5000 kPa	G*XSin(d) X.001	BBR-S MAX 300 000 kPa	BBR-S X.00001	BBR-m MIN 0.300	BBR-m X10
DYNAMIC SHEAR	76								
DYNAMIC SHEAR	70	0 611	1 234						
DYNAMIC SHEAR	64	1 054	2 312						
DYNAMIC SHEAR	58	1 859	4 334						
DYNAMIC SHEAR	52	3 594	8 521						
DYNAMIC SHEAR	46								
DYNAMIC SHEAR	34								
DYNAMIC SHEAR	31								
DYNAMIC SHEAR	28								
DYNAMIC SHEAR	25								
DYNAMIC SHEAR	22								
DYNAMIC SHEAR	19								
DYNAMIC SHEAR	16			847	0 847	<<<<<			
DYNAMIC SHEAR	13			999	0 999				
DYNAMIC SHEAR	10			2579	2 579				
DYNAMIC SHEAR	7								
BENDING BEAM	0								
BENDING BEAM	-6								
BENDING BEAM	-12								
BENDING BEAM	-18					79800	0 798	0 369	3 69
BENDING BEAM	-24					161000	1 610	0 318	3 18
BENDING BEAM	-30					334000	3 340	0 265	2 65
BENDING BEAM	-36								
PHYS HARD INDX				Unaged 1 hr cond					
				Unaged 24 hr cond					

<<<<< TEMP AT WHICH G* MUST BE LESS THAN 5000 kPa TO MEET PG 58-34

SHRP PERFORMANCE GRADE DETERMINATION

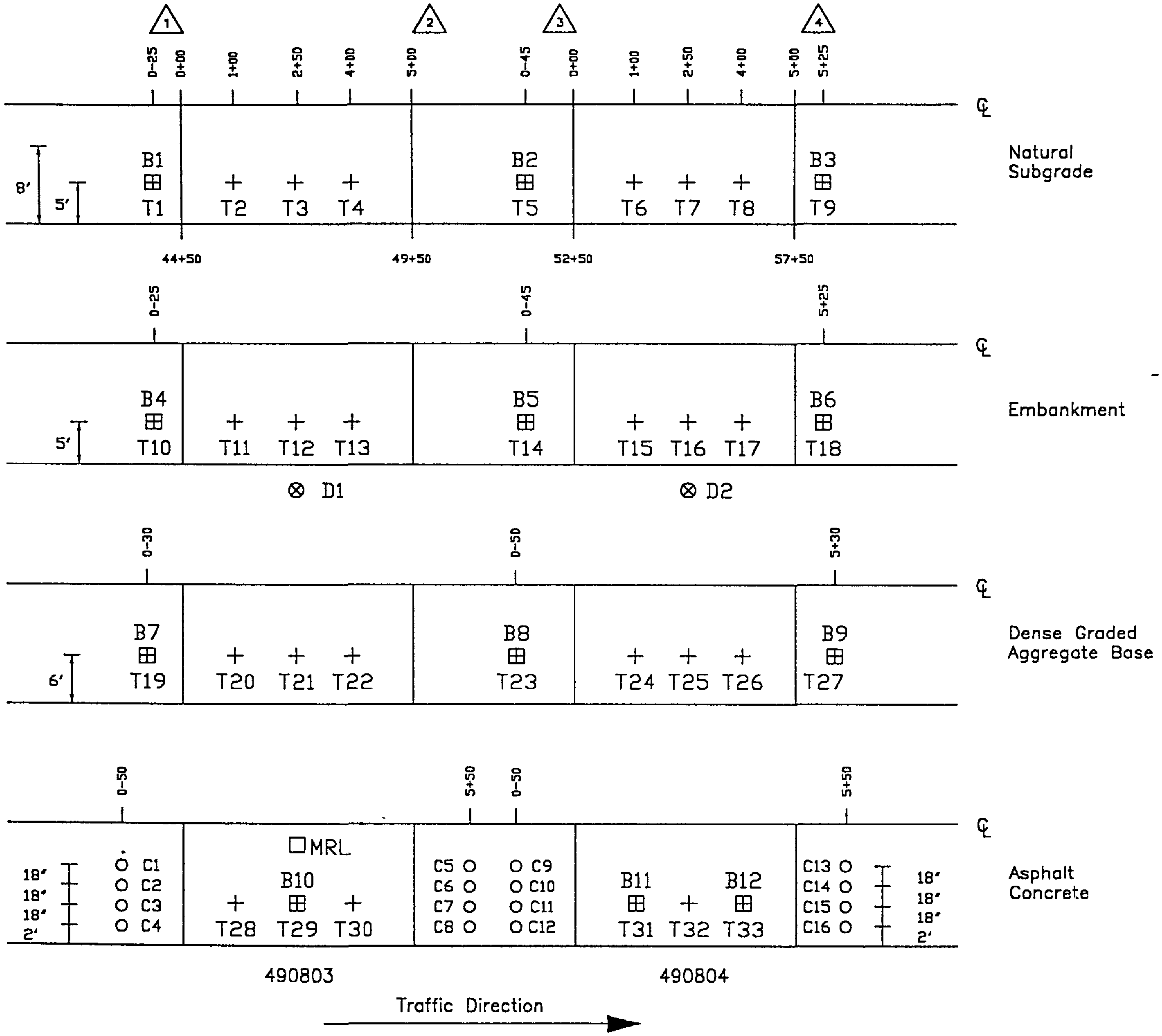


SHADED AREAS BELOW INDICATE SHRP GRADES IN SPECIFICATION

PAVEMENT TEMPERATURE EXPOSURE LIMITS, FAST TRANSIENT LOADS, DEG C *(DEG F)*									
MAX 7 DAY AVE ROAD SURFACE		LOWEST AIR TEMPERATURE TO RESIST THERMAL CRACKING							
		(14)	*(3)*	*(-8)*	*(-18)*	*(-37)*	*(-40)*	*(-51)*
PG	52 (126)	-10	-16	-22	-28	-34	-40	-46
PG	58 (136)		-16	-22	-28	-34	-40	
PG	64 (147)		-16	-22	-28	-34	-40	
PG	70(158)	-10	-16	-22	-28	-34		
PG	76 (169)	-10	-16	-22	-28	-34		

APPENDIX C

MATERIALS SAMPLING PLAN



□ MRL Bulk sample of AC mixture to ship to MRL, top lift
⊗ D1–D2 – 20' Splitspoon sampling
○ A1–A6 – Thinwall tube samples of Natural Subgrade
+ T1–T9 – Moisture–density test on Natural Subgrade
□ B1–B3 – Bulk samples of Natural Subgrade
+ T10–T18 – Moisture–density tests on Embankment (nuclear)
□ B4–B6 – Bulk samples of Embankment
+ T19–T27 – Moisture–density test on DGAB (nuclear)
□ B7–B9 – Bulk samples of DGAB
+ T28–T33 – Density tests on AC (nuclear)
□ B10–B12 – Bulk samples of AC Mixture
○ C1–C16 – 4" cores of AC surface
△ Sampling Areas

Note: B10 taken from top lift, B11 taken from bottom lift, B12 taken from top lift.

Table 5. Field and laboratory test plan for **Natural Subgrade** materials, SPS-8, Utah.

Test Name	SHRP Test Designation	SHRP Protocol	Number of Tests	Material Source / Test Location
Sieve Analysis	SS01	Ship to FHWA Lab	3	B1 - B3
Hydrometer to 0.01 mm	SS02	Ship to FHWA Lab	3	B1 - B3
Atterberg Limits	SS03	Ship to FHWA Lab	3	B1 - B3
Classification and Type of Subgrade	SS04	Ship to FHWA Lab	6	B1 - B3, A1, A3, A5
Classification and Type of Subgrade	SS04	P52[1]	3	A2, A4, A6
Moisture-Density Relations	SS05	Ship to FHWA Lab	3	B1 - B3
Resilient Modulus	SS07	Ship to FHWA Lab	3	A1, A3, A5 or B1 - B3
Unit Weight	SS08	P56	2	A4, A6
Natural Moisture Content	SS09	Ship to FHWA Lab	3	B1 - B3
Unconfined Compression Strength	SS10	P54	2	A2, A4
Permeability	SS11 or UG09	P57 or P48	1	A2 or B2
In-Place Density		SHRP-LTPP Method	9	T1-T9

Note 1. Visual-manual classification method ONLY.

Table 9. Field and laboratory test plan for **Prepared Embankment** materials, SPS-8 Utah.

Test Name	LTPP Test Designation	LTPP Protocol	Number of Tests	Material Source / Test Location
Sieve Analysis	SS01	Ship to FHWA Lab	3	B4 - B6
Hydrometer to 0.01 mm	SS02	Ship to FHWA Lab	3	B4 - B6
Atterberg Limits	SS03	Ship to FHWA Lab	3	B4 - B6
Subgrade Classification and Type	SS04	Ship to FHWA Lab	3	B4 - B6
Moisture-Density Relations	SS05	Ship to FHWA Lab	3	B4 - B6
Resilient Modulus	SS07	Ship to FHWA Lab	3	B4 - B6
Natural Moisture Content	SS09	Ship to FHWA Lab	3	B4 - B6
Hydraulic Conductivity	UG09	P48	1	B5
In-Place Density		LTPP Method	9	T10-T18
Depth to Rigid Layer		LTPP Method	2	D1 - D2
Expansion Index	SS12	P60	20	D1 - D2

Note 1. Visual-manual classification method only.

Table 13. Field and laboratory test plan for **Dense Graded Aggregate Base** materials, SPS-8 Utah.

Test Name	SHRP Test Designation	SHRP Protocol	Number of Tests	Material Source / Test Location
Particle Size Analysis	UG01	Ship to FHWA lab[1]	3	B7 - B9
Sieve Analysis (washed)	UG02	Ship to FHWA lab[1]	3	B7 - B9
Atterberg Limits	UG04	Ship to FHWA lab[1]	3	B7 - B9
Moisture-Density Relations	UG05	Ship to FHWA lab[1]	3	B7 - B9
Resilient Modulus	UG07	Ship to FHWA lab[1]	3	B7 - B9
Classification	UG08	Ship to FHWA lab[1]	3	B7 - B9
Permeability	UG09	P48	3	B7 - B9
Natural Moisture Content	UG10	Ship to FHWA lab[1]	3	B7 - B9
In-Place Density		SHRP-LTPP Method	9	T19 - T27

Note 1: Ship to FHWA lab after splitting and quartering a 100 pound sample for the state testing.

Table 16. Field and laboratory test plan for Asphalt Concrete surface materials, SPS-8 Utah.

Test Name	SHRP Test Designation	SHRP Protocol	Number of Tests	Material Source / Test Location
Core Examination/Thickness	AC01	P01	3	C10 - C12
Bulk Specific Gravity	AC02	P02	3	C10 - C12
Maximum Specific Gravity	AC03	P03	3	B10 - B12 from paver
Asphalt Content (Extraction)	AC04	P04	3	B10 - B12 from paver
Moisture Susceptibility	AC05	P05	3	B10 - B12 from paver
Creep compliance	AC06	Ship to FHWA Lab	1	C9
Resilient Modulus	AC07	Ship to FHWA Lab	3	C1-C3, C5-C7, C13-C15
Indirect Tensile Strength	AC07	Ship to FHWA Lab	3	C4, C8, C16
In-Place Density		SHRP-LTPP Method	6	T28-T33
Asphalt Cement				
Abson Recovery	AE01	P21	3	B10 - B12 from paver
Penetration @ 77F, 115F	AE02	P22	3	B10 - B12 from paver
Specific Gravity @ 60F	AE03	P23	3	B10 - B12 from paver
Viscosity @ 77F	AE04	P24	3	B10 - B12 from paver
Viscosity @ 140F, 275F	AE05	P25	3	B10 - B12 from paver
Extracted Aggregate				
Specific Gravity of Coarse Aggregate	AG01	P11	3	B10 - B12 from paver
Specific Gravity of Fine Aggregate	AG02	P12	3	B10 - B12 from paver
Aggregate Gradation	AG04	P14	3	B10 - B12 from paver
NAA Test for Fine Aggregate Particle Shape	AG05	P14A	3	B10 - B12 from paver
Asphalt Cement (From Plant)				
Penetration @ 77F, 115F	AE02	P22	3	B13 - B15 from plant
Specific Gravity @ 60F	AE03	P23	3	B13 - B15 from plant
Viscosity @ 77F	AE04	P24	3	B13 - B15 from plant
Viscosity @ 140F, 275F	AE05	P25	3	B13 - B15 from plant

APPENDIX D

CONSTRUCTION DATA FORMS

SPS-8 CONSTRUCTION DATA SHEET 1 PROJECT IDENTIFICATION	* STATE CODE [illegible] * SPS PROJECT CODE [illegible] * TEST SECTION NO. [illegible]

*1. DATE OF DATA COLLECTION OR UPDATE (Month/Year) [0 6/2 4]

*2. STATE HIGHWAY AGENCY (SHA) DISTRICT NUMBER [_ _.]

*3. COUNTY OR PARISH [W A S.]

4. FUNCTIONAL CLASS (SEE TABLE A.2, APPENDIX A) [0 6.]

*5. ROUTE SIGNING (NUMERIC CODE) [3.]
Interstate... 1 U.S.... 2 State... 3
Other... 4

*6. ROUTE NUMBER [S H - 3 5.]

7. TYPE OF PAVEMENT (01 for Granular Base, 02 for Treated Base) [0 1.]

8. NUMBER OF THROUGH LANES (ONE DIRECTION) [1.]

*9. DATE OF CONSTRUCTION COMPLETION (Month/Year) [_ ?/_ _] 97

*10. DATE OPENED TO TRAFFIC (Month/Year) [0 6/8 6]

11. CONSTRUCTION COSTS PER LANE MILE (In $1000) 7 [6 8 2 2 7.]

12. DIRECTION OF TRAVEL [1.]
East Bound... 1 West Bound... 2 North Bound... 3
South Bound... 4

PROJECT STARTING POINT LOCATION

*13. MILEPOINT [_ _ _._ _]

*14. ELEVATION [_ 7 2 6 0]

*15. LATITUDE [_ _° _ _' _ _ . _ _"]

*16. LONGITUDE [_ _ _° _ _' _ _ . _ _"]

17. ADDITIONAL LOCATION INFORMATION (SIGNIFICANT LANDMARKS): [6/10 mile
East of Bridge crossing Provo River.
]

18. HPMS SAMPLE NUMBER (HPMS ITEM 28) [_ _ _ _ _ _ _ _ _ _ _ _]

19. HPMS SECTION SUBDIVISION (HPMS ITEM 29) [_.]

PREPARER [signature] EMPLOYER FHWA - CFLHA DATE 6/27/96

SPS-8 CONSTRUCTION DATA SHEET 2 GEOMETRIC, SHOULDER AND DRAINAGE INFORMATION	* STATE CODE [4 9] * SPS PROJECT CODE [0 8] * TEST SECTION NO. [0 0]

*1. LANE WIDTH (FEET) [1 1.]

2. MONITORING SITE LANE NUMBER [1.]
(LANE 1 IS OUTSIDE LANE, NEXT TO SHOULDER
LANE 2 IS NEXT TO LANE 1, ETC.)

*3. SUBSURFACE DRAINAGE LOCATION [3.]
Continuous Along Test Section... 1 Intermittent... 2 None... 3

*4. SUBSURFACE DRAINAGE TYPE [1.]
No Subsurface Drainage... 1 Longitudinal Drains... 2
Transverse Drains... 3 Drainage Blanket... 4 Well System... 5
Drainage Blanket with Longitudinal Drains... 6
Other (Specify)... 7 ____________

SHOULDER DATA	INSIDE SHOULDER	OUTSIDE SHOULDER
*5. SURFACE TYPE Turf... 1 Granular.... 2 Asphalt Concrete... 3 Concrete... 4 Surface Treatment... 5 Other (Specify)... 6 ____________	[_.]	[3.]
*6. TOTAL WIDTH (FEET)	[_ _.]	[0 3.]
*7. PAVED WIDTH (FEET)	[_ _.]	[0 3.]
8. SHOULDER BASE TYPE (CODES-TABLE A.6)	[_ _.]	[2 3.]
9. SURFACE THICKNESS (INCHES)	[_ _. _]	[_ 2. 0]/4.0
*10. SHOULDER BASE THICKNESS (INCHES)	[_ _. _]	[_ 3. 0]/6.0
11. DIAMETER OF LONGITUDINAL DRAINPIPES (INCHES)		[N. _]
12. SPACING OF LATERALS (FEET)		[_ N _.]

September 1992

SPS-8 CONSTRUCTION DATA SHEET 14 SUBGRADE PREPARATION	* STATE CODE [4 9] * SPS PROJECT CODE [0 8] * TEST SECTION NO. [0 0]

*1. SUBGRADE PREPARATION BEGAN (Month-Day-Year) [0 6-0 3-9 6]

*2. SUBGRADE PREPARATION COMPLETED (Month-Day-Year) [0 8-0 9-9 6]

PRIMARY COMPACTION EQUIPMENT

*3. CODE TYPE [H 4]

COMPACTION EQUIPMENT TYPE CODES
Sheepsfoot... 1 Pneumatic Tired... 2 Steel Wheel Tandem... 3
Single Drum Vibr.... 4 Double Drum Vibr.... 5
Other (Specify)... 6 ______

*4. GROSS WEIGHT (TONS) [_ 0.0] ?

		TYPE	PERCENT
*5.	STABILIZING AGENT 1	[_]	[_ N._]
*6.	STABILIZING AGENT 2	[_]	[_ N._]

STABILIZING AGENT TYPE CODES
Portland Cement... 1 Lime... 2 Fly Ash, Class C... 3
Fly Ash, Class N... 4
Other (Specify)... 5 ______

*7. TYPICAL LIFT THICKNESS (INCHES) [1 2]
(For Fill Sections Only)

DENSITY DATA IS RECORDED ON SAMPLING DATA SHEET 8-1

8. SIGNIFICANT EVENTS DURING CONSTRUCTION (DISRUPTIONS, RAIN, EQUIPMENT PROBLEMS, ETC.) ______

PREPARER [signature] EMPLOYER [illegible] DATE [illegible]

September 1992

SPS-8 CONSTRUCTION DATA SHEET 5 PLANT-MIXED ASPHALT BOUND LAYERS AGGREGATE PROPERTIES	* STATE CODE [4 9] * SPS PROJECT CODE [0 8] * TEST SECTION NO. 03 [~~0 4~~]

*1. LAYER NUMBER (FROM SHEET 4) [4]

COMPOSITION OF COARSE AGGREGATE AS BUILT FROM CFLHD MIX DESIGN — TYPE — PERCENT

*2. Crushed Stone... 1 Gravel... 2 Crushed Gravel... 3 [3] [_ 4 2.]

*3. Crushed Slag... 4 Manufactured Lightweight... 5 [_] [_ _ _.]

*4. Other (Specify)... 6 ______ [_] [_ _ _.]

COMPOSITION OF FINE AGGREGATE — TYPE — PERCENT

*5. Natural Sand... 1 [2] [_ 5 8.]

*6. Crushed or Manufactured Sand (From Crushed Gravel or [_] [_ _ _.]

*7. Stone... 2 Recycled Concrete... 3 [_] [_ _ _.]
Other (Specify)... 4 ______

*8. TYPE OF MINERAL FILLER [_]
Stone Dust... 1 Hydrated Lime... 2 Portland Cement... 3
Fly Ash... 4
Other (Specify)... 5 ______

BULK SPECIFIC GRAVITIES:

*9. Coarse Aggregate (AASHTO T85 or ASTM C127) [2.6 1 5]

*10. Fine Aggregate (AASHTO T84 or ASTM C128) [2.5 6 7]

*11. Mineral Filler (AASHTO T100 or ASTM D854) [_. — _ _]

*12. Aggregate Combination (Calculated) [2.5 4 5]

13. Effective Specific Gravity of Aggregate Combination [2.5 9 0]
(Calculated) USED WESTERN COLORADO TESTING LAB'S

AGGREGATE DURABILITY TEST RESULTS
(SEE DURABILITY TEST TYPE CODES, TABLE A.13)

	TYPE OF AGGREGATE	TYPE OF TEST	RESULTS % LOSS
14.	Coarse	[0 1]	[_ 37.% _ _]
15.	Coarse	[0 3]	[_ _ 1.3 % _]
16.	Coarse	[_ _]	[_ _ _._ _ _]
17.	Coarse and Fine - Combined	[_ _]	[_ _ _._ _ _]

18. POLISH VALUE OF COARSE AGGREGATES _ _.
SURFACE LAYER ONLY (AASHTO T279, ASTM D3319)

PREPARER [signature] EMPLOYER FHWA - CFLHD DATE 1/28/98

September 1992

SPS-8 CONSTRUCTION DATA SHEET 6 PLANT-MIXED ASPHALT BOUND LAYERS ASPHALT CEMENT PROPERTIES	* STATE CODE [4 9] * SPS PROJECT CODE [0 8] * TEST SECTION NO. 03 [0 4]

*1. LAYER NUMBER (FROM SHEET 4) [4]

*2. ASPHALT GRADE (SEE ASPHALT CODE SHEET, TABLE A.16) [1 2]
(IF OTHER, SPECIFY) PG 58-34

*3. SOURCE (SEE SUPPLY CODE SHEET, TABLE A.14) [7 2]
(IF OTHER, SPECIFY) Conoco, Salt Lake City, UT

4. SPECIFIC GRAVITY OF ASPHALT CEMENT [1.014]
(AASHTO T228)

GENERAL ASPHALT CEMENT PROPERTIES (If available from supplier)

PG Grade was used

5. VISCOSITY OF ASPHALT AT 140°F (POISES) See ATTACHED paperwork [_ _ _ _ - _.]
(AASHTO T202)

6. VISCOSITY OF ASPHALT AT 275°F (CENTISTOKES) [_ _ _ _.- _]
(AASHTO T202)

7. PENETRATION AT 77°F (AASHTO T49) (TENTHS OF A MM) [_ _ - _.]
(100 g., 5 sec.)

ASPHALT MODIFIERS (SEE TYPE CODE, A.15)

	TYPE	QUANTITY (%)
8. MODIFIER #1	[-]	[_ - .]
9. MODIFIER #2 (IF OTHER, SPECIFY) SBS polymers	[2 7]	[_ 7.]

10. DUCTILITY AT 77°F (CM) [_ - _.]
(AASHTO T51)

11. DUCTILITY AT 39.2°F (CM) [_ - _.]
(AASHTO T51)

12. TEST RATE FOR DUCTILITY MEASUREMENT [_ - _.]
AT 39.2°f (CM/MIN)

13. PENETRATION AT 39.2°F (AASHTO T49) (TENTHS OF A MM) [_ - _.]
(200 g., 60 sec.)

14. RING AND BALL SOFTENING POINT (AASHTO T53) (°F) [_ - _.]

NOTE: If emulsified or cutback asphalt was used, enter "N" in the spaces for "Original Asphalt Cement Properties".

[signature] FHWA-CFLHD DATE 12/8/98

September 1992

SPS-8 CONSTRUCTION DATA SHEET 7 PLANT-MIXED ASPHALT BOUND LAYERS MIXTURE PROPERTIES	* STATE CODE [4 9] * SPS PROJECT CODE [0 8] * TEST SECTION NO. 03 [0 4]

*1. LAYER NUMBER (FROM SHEET 4) [4]

*2. TYPE OF SAMPLES * SEE NOTE ON EACH SECTION [*]
SAMPLES COMPACTED IN LABORATORY... 1
SAMPLES TAKEN FROM TEST SECTION... 2

*3. MAXIMUM SPECIFIC GRAVITY (NO AIR VOIDS) AVERAGE OF SAMPLES B10, B11, B12 [2.3 1 6]
(AASHTO T209 OR ASTM D2041)

BULK SPECIFIC GRAVITY (ASTM D1188) INCLUDES 2 - CFLHO's CONTROL STRIPS

*4. MEAN [2.1 7 7] NUMBER OF TESTS [3 1.]

5. MINIMUM [2.1 0 6] MAXIMUM [2.2 3 2]

6. STD. DEV. [2.8 8 9]

ASPHALT CONTENT (PERCENT WEIGHT OF TOTAL MIX)
(AASHTO T164 OR ASTM D2172) AC CONTENT by NUCLEAR OVEN METHOD IN FIELD

*7. MEAN [5.9 3 9] NUMBER OF SAMPLES [2 1.]

8. MINIMUM [5.4 3 __] MAXIMUM [6.8 0 __]

9. STD. DEV. [0.4 5 5]

PERCENT AIR VOIDS SAMPLES FROM TEST SECTION - CORES C10, C11, C12

*10. MEAN [7.6 __ __] NUMBER OF SAMPLES [__ 3.]

11. MINIMUM [7.1 __ __] MAXIMUM [8.1 __ __]

12. STD. DEV. [0.5 0 3]

*13. VOIDS IN MINERAL AGGREGATE (PERCENT) CFLHO's MIX DESIGN [1 5.5]

*14. EFFECTIVE ASPHALT CONTENT (PERCENT) USING #7 MEAN & CFLHO's MIX DESIGN ABSORPTION 1.2 [__ 4.8]

*15. MARSHALL STABILITY (LBS) (AASHTO T245 OR ASTM D1559) [__ __ -.__]

*16. NUMBER OF BLOWS [- __]

*17. MARSHALL FLOW (HUNDREDTHS OF AN INCH)
(AASHTO T245 OR ASTM D1559) [__ __ - __.]

*18. HVEEM STABILITY (AASHTO T246 OR ASTM D1561) AVERAGE OF TEST SECTION SAMPLES B10, B11, B12 [__ 3 1.]

*19. HVEEM COHESIOMETER VALUE (GRAMS/25 MM OF WIDTH)
(AASHTO T246 OR ASTM 1561) [__ __ - __.]

September 1992

SPS-8 CONSTRUCTION DATA SHEET 8 PLANT-MIXED ASPHALT BOUND LAYERS MIXTURE PROPERTIES (CONTINUED)	* STATE CODE [4 9] * SPS PROJECT CODE [0 8] * TEST SECTION NO. 03 [~~04~~]

*1. LAYER NUMBER (FROM SHEET 4) [4]

*2. TYPE OF SAMPLES [__]
SAMPLES COMPACTED IN LABORATORY... 1
SAMPLES TAKEN FROM TEST SECTION... 2

*3. TYPE ASPHALT PLANT [1]

BATCH PLANT... 1 DRUM MIX PLANT... 2

OTHER (SPECIFY)... 3 ____________________

*4. TYPE OF ANTISTRIPPING AGENT USED [1 9]
(SEE TYPE CODES, TABLE A.21)
OTHER (SPECIFY) ____________________

*5. AMOUNT OF ANTISTRIPPING AGENT USED LIQUID OR SOLID CODE [2]

*6. (If liquid, enter code 1, and amount as percent of asphalt cement weight. If solid, enter code 2 and amount as percent of aggregate weight.) [__ 1.0]

[signature] FHWA - CFLHD 1/28/98

September 1992

SPS-8 CONSTRUCTION DATA SHEET 9 PLANT-MIXED ASPHALT BOUND LAYERS PLACEMENT DATA	* STATE CODE [4 9] * SPS PROJECT CODE [0 8] * TEST SECTION NO. 03, [0 4]

*1. DATE PAVING OPERATIONS BEGAN (Month-Day-Year) [0 9 - 2 5 - 9 2] 12:35

*2. DATE PAVING OPERATIONS COMPLETED (Month-Day-Year) [1 0 - 2 1 - 9 2]

*3 ASPHALT CONCRETE PLANT AND HAUL

	Type	Name	Haul Distance (Mi)	Time (Min)	Layer Numbers	Section
Plant 1	[1]	Valley Asphalt @ Z-lake	[_ 1 0]	[1 5]	[1] [2] [3]	04
Plant 2	[__]		[__ __ __]	[__ __]	[1] [2] [__]	03
Plant 3	[__]		[__ __ __]	[__ __]	[__] [__] [__]	

Plant Type: Batch..... 1 Drum Mix.... 2 Other...3 Specify________

4. MANUFACTURER OF ASPHALT CONCRETE PAVER Blaw Knox / Barber Greene Windrow El

5. MODEL DESIGNATION OF ASPHALT CONCRETE PAVER PF 5510 / 061

6. SINGLE PASS LAYDOWN WIDTH (Feet) [1 5 . 5]

7. AC ~~BINDER~~ SURFACE COURSE LIFT SECTION 03 4" depth
   Layer Number [__ __]
   Nominal First Lift Placement Thickness (Inches) [2 . 0]
   Nominal Second Lift Placement Thickness (Inches) [2 . 0]

8. AC SURFACE COURSE LIFT SECTION 04 7" depth
   Layer Number [__ __]
   Nominal First Lift Placement Thickness (Inches) [2 . 5]
   Nominal Second Lift Placement Thickness (Inches) [2 . 5]
   Third Lift 2 . 0

9. SURFACE FRICTION ~~COURSE~~ (If Placed)
   Layer Number [NA]
   Nominal Placement Thickness (Inches) [NA]

10. TEST SECTION STATION OF TRANSVERSE JOINTS (within test section)
   Binder Course [__ + NA]
   Surface Course [__ + __ __]
   Surface Friction Course [__ + __ __]

11. LOCATION OF LONGITUDINAL SURFACE JOINT [1]
   Between lanes.. 1 Within lane.. 2
   (specify offset from O/S feet) [1 5 . 5]

12. SIGNIFICANT EVENTS DURING CONSTRUCTION (disruptions, rain, equip. problems, etc.) Rain, Lack of Aggregate, Clay pumping (removed)

PREPARER [illegible] EMPLOYER [illegible] [illegible]

SPS-8 CONSTRUCTION DATA SHEET 10 PLANT-MIXED ASPHALT BOUND LAYERS COMPACTION DATA	* STATE CODE [4 9] * SPS PROJECT CODE [0 8] * TEST SECTION NO. 03, [0 4]

*1. DATE PAVING OPERATIONS BEGAN (Month-Day-Year) [09-25-97]
*2. DATE PAVING OPERATIONS COMPLETED (Month-Day-Year) [10-21-97]
*3. LAYER NUMBER [1]

*4. MIXING TEMPERATURE (°F) [300.]

5. LAYDOWN TEMPERATURES (°F) PETE PRADERE of NICHOLS TOOK TEMPS
Mean................ __ __ __.
Number of Tests .... __ __.
Minimum.............. __ __ __.
Maximum.................. __ __ __.
Standard Deviation... __ __.__

ROLLER DATA

	Roller Code #	Roller Description	Gross Wt (Tons)	Tire Press. (psi)	Frequency (Vibr./Min)	Amplitude (Inches)	Speed (mph)
6	A	Steel-Whl Tandem	__ __.__				
7	B	Steel-Whl Tandem	__ __.__				
8	C	Steel-Whl Tandem	__ __.__				
9	D	Steel-Whl Tandem	__ __.__				
10	E	Pneumatic-Tired	__ __.__	__ __ __ __.			
11	F	Pneumatic-Tired	__ __.__	__ __ __ __.			
12	G H-108	Pneumatic-Tired	__ __.__	__ __ __ __.			
13	H	Pneumatic-Tired	__ __.__	__ __ __ __.			
14	I	Single-Drum Vibr.	__ __.__		__ __ __ __.	.__ __ __	__ __.__
15	J	Single-Drum Vibr.	__ __.__		__ __ __ __.	.__ __ __	__ __.__
16	K CS-433C	Single-Drum Vibr.	__ __.__		__ __ __ __.	.__ __ __	__ __.__
17	L	Single-Drum Vibr.	__ __.__		__ __ __ __.	.__ __ __	__ __.__
18	M	Double-Drum Vibr.	__ __.__		__ __ __ __.	.__ __ __	__ __.__
19	N DD-110	Double-Drum Vibr.	__ __.__		__ __ __ __.	.__ __ __	__ __.__
20	O	Double-Drum Vibr.	__ __.__		__ __ __ __.	.__ __ __	__ __.__
21	P	Double-Drum Vibr.	__ __.__		__ __ __ __.	.__ __ __	__ __.__
22	Q	Other					

	COMPACTION DATA	First Lift SECTION 03	Second Lift →	~~Third~~ Lift SECTION 04 1ST	~~Fourth~~ Lift 2nd	3rd Lift
	BREAKDOWN Ingersoll Rand DD-110					
23	Roller Code (A-Q)	M	M	__	__	
24	Coverages	__ 5.	__ 5.	__ __.	__ __.	
	INTERMEDIATE CAT H-108					
25	Roller Code (A-Q)	G	G	__	__	
26	Coverages	__ 4.	__ 4.	__ __.	__ __.	
	FINAL CAT CS-433C					
27	Roller Code (A-Q)	I	I	__	__	
28	Coverages	__ 4.	__ 4.	__ __.	__ __.	04
29	Air Temperature (°F)	03 __ 81.	08 __ 81.	04 __ 80.	04 __ 80.	80
30	Compacted Thickness (In)	2.0	2.0	2.5	2.5	2.
31	Curing Period (Days)	__ 1.0	__ 1.0	__ 1.0	__ 1.0	1.

SPS-8 CONSTRUCTION DATA SHEET 11 PLANT-MIXED ASPHALT BOUND LAYERS DENSITY AND PROFILE DATA	* STATE CODE [4 9] * SPS PROJECT CODE [0 8] * TEST SECTION NO. [0 3]

1. NUCLEAR DENSITY MEASUREMENTS T28 10/16/92 45+50 6' Rt of CL

LAYER TYPE	Binder Course	Surface Course	Surface Friction Layer
Measurement Method (A, B, C)[1]	__	B	__
Number of Measurement	__ __	135.9 135.4 137.4 134.5	__ __
Average (pcf)	__ __ __.__	135.8	__ __ __.__
Maximum (pcf)	__ __ __.__	137.4	__ __ __.__
Minimum (pcf)	__ __ __.__	134.5	__ __ __.__
Standard Deviation (pcf)	__ __ __.__	__ __ 1.2	__ __ __.__
Layer Number	__ __	__ 4	__ __

[1] Measurement Method Backscatter... A Direct Transmission... B Air Gap... C

2. MANUFACTURER OF NUCLEAR DENSITY GAUGE Troxler
3. NUCLEAR DENSITY GAUGE MODEL NUMBER 3440
4. NUCLEAR DENSITY GAUGE IDENTIFICATION NUMBER 15175
5. NUCLEAR GAUGE COUNT RATE FOR STANDARDIZATION __ 2944
6. PROFILOGRAPH MEASUREMENTS

   Profilograph Type California... 1 Rainhart... 2 — 1
   Profile Index (Inches/Mile) — __ 8
   Interpretation Method Manual.. 1 Mechanical.. 2 Computer.. 3 — 1
   Height of Blanking Band (Inches) — 0.2 __
   Cutoff Height (Inches) — 0.4 __

7. SURFACE PROFILE USED AS BASIS OF INCENTIVE PAYMENT? (YES, NO) Yes

PREPARER EMPLOYER DATE

SPS-8 CONSTRUCTION DATA SHEET 11 PLANT-MIXED ASPHALT BOUND LAYERS DENSITY AND PROFILE DATA	* STATE CODE [4 9] * SPS PROJECT CODE [0 8] * TEST SECTION NO. [0 3]

1. NUCLEAR DENSITY MEASUREMENTS T29 10/16/97 47+00 6' LT of ¢

LAYER TYPE	Binder Course	Surface Course	Surface Friction Layer
Measurement Method (A, B, C)[1]	__	B	__
Number of Measurement	__ __	134.6 133.0 139.0 136.4	__ __
Average (pcf)	___.__	135.75	___.__
Maximum (pcf)	___.__	139.0	___.__
Minimum (pcf)	___.__	133.0	___.__
Standard Deviation (pcf)	___.__	2.6	___.__
Layer Number	__ __	4	__ __

[1] Measurement Method Backscatter... A Direct Transmission... B Air Gap... C

2. MANUFACTURER OF NUCLEAR DENSITY GAUGE Troxler

3. NUCLEAR DENSITY GAUGE MODEL NUMBER 3440

4. NUCLEAR DENSITY GAUGE IDENTIFICATION NUMBER 15175

5. NUCLEAR GAUGE COUNT RATE FOR STANDARDIZATION 2944

6. PROFILOGRAPH MEASUREMENTS

Profilograph Type California... 1 Rainhart... 2 1
Profile Index (Inches/Mile) 8
Interpretation Method Manual.. 1 Mechanical.. 2 Computer.. 3 1
Height of Blanking Band (Inches) 0.2
Cutoff Height (Inches) 0.4

7. SURFACE PROFILE USED AS BASIS OF INCENTIVE PAYMENT? (YES, NO) Yes

SPS-8 CONSTRUCTION DATA SHEET 11 PLANT-MIXED ASPHALT BOUND LAYERS DENSITY AND PROFILE DATA	* STATE CODE [4 9] * SPS PROJECT CODE [0 8] * TEST SECTION NO. [0 3]

1. NUCLEAR DENSITY MEASUREMENTS   T 30   10/16/97   48+50 6' Rt of CL

LAYER TYPE	Binder Course	Surface Course	Surface Friction Layer
Measurement Method (A, B, C)[1]	_	B	_
Number of Measurement	_ _	134.6 136.4 135.2 134.4	_ _
Average (pcf)	_ _ _ . _	135.15	_ _ _ . _
Maximum (pcf)	_ _ _ . _	136.4	_ _ _ . _
Minimum (pcf)	_ _ _ . _	134.4	_ _ _ . _
Standard Deviation (pcf)	_ _ _ . _	_ _ 0.9	_ _ _ . _
Layer Number	_ _	_ 4	_ _

[1] Measurement Method   Backscatter... A   Direct Transmission... B   Air Gap... C

2. MANUFACTURER OF NUCLEAR DENSITY GAUGE   Troxler

3. NUCLEAR DENSITY GAUGE MODEL NUMBER   3440

4. NUCLEAR DENSITY GAUGE IDENTIFICATION NUMBER   15175

5. NUCLEAR GAUGE COUNT RATE FOR STANDARDIZATION   _ 2 9 4 4

6. PROFILOGRAPH MEASUREMENTS

Profilograph Type   California... 1   Rainhart... 2   1
Profile Index (Inches/Mile)   _ 8
Interpretation Method   Manual.. 1   Mechanical.. 2   Computer.. 3   1
Height of Blanking Band (Inches)   0.2 _
Cutoff Height (Inches)   0.4 _

7. SURFACE PROFILE USED AS BASIS OF INCENTIVE PAYMENT? (YES, NO)   Yes

PREPARER   EMPLOYER   DATE

SPS-8 CONSTRUCTION DATA
SHEET 12
LAYER THICKNESS MEASUREMENTS

* STATE CODE [49]
* SPS PROJECT CODE [08]
* TEST SECTION NO. 03 [~~04~~]

Pete Pradere of Nichols took depth Measurements.

SHEET 1 OF 2

STATION NUMBER	OFFSET (Inches)	LAYER THICKNESS MEASUREMENTS (Inches): DENSE GRADED AGGREGATE BASE	PORTLAND CEMENT CONCRETE SURFACE	ASPHALT SURFACE AND BINDER	SURFACE FRICTION LAYER
0+00	0	9.5	__ __.__	4.0	__ __.__
	36	9.6	__ __.__	4.2	__ __.__
	72	9.1	__ __.__	4.3	__ __.__
	108	9.0	__ __.__	4.6	__ __.__
	144	9.1	__ __.__	5.0	__ __.__
0+50	0	8.3	__ __.__	4.2	__ __.__
	36	8.3	__ __.__	4.2	__ __.__
	72	8.2	__ __.__	4.2	__ __.__
	108	7.6	__ __.__	4.3	__ __.__
	144	7.0	__ __.__	4.7	__ __.__
1+00	0	8.0	__ __.__	4.1	__ __.__
	36	8.6	__ __.__	4.2	__ __.__
	72	6.6	__ __.__	4.1	__ __.__
	108	6.1	__ __.__	4.2	__ __.__
	144	5.8	__ __.__	4.4	__ __.__
1+50	0	8.4	__ __.__	3.6	__ __.__
	36	8.2	__ __.__	4.0	__ __.__
	72	7.6	__ __.__	4.2	__ __.__
	108	7.1	__ __.__	4.6	__ __.__
	144	6.8	__ __.__	5.0	__ __.__
2+00	0	9.4	__ __.__	2.3	__ __.__
	36	8.0	__ __.__	3.7	__ __.__
	72	8.2	__ __.__	4.0	__ __.__
	108	8.4	__ __.__	4.3	__ __.__
	144	8.4	__ __.__	4.7	__ __.__
2+50	0	7.7	__ __.__	3.8	__ __.__
	36	7.4	__ __.__	4.0	__ __.__
	72	7.0	__ __.__	4.2	__ __.__
	108	6.6	__ __.__	4.3	__ __.__
	144	6.4	__ __.__	4.7	__ __.__
3+00	0	8.8	__ __.__	3.7	__ __.__
	36	9.0	__ __.__	4.0	__ __.__
	72	8.4	__ __.__	4.0	__ __.__
	108	8.3	__ __.__	4.0	__ __.__
	144	8.3	__ __.__	4.2	__ __.__
LAYER NUMBER		__ __	__ __	__ __	__ __

SPS-8 CONSTRUCTION DATA SHEET 12 LAYER THICKNESS MEASUREMENTS	* STATE CODE [49] * SPS PROJECT CODE [08] * TEST SECTION NO. 03 [~~04~~]

Pete Pradere of Nichols took depth Measurements.

SHEET 2 OF 2

STATION NUMBER	OFFSET (Inches)	LAYER THICKNESS MEASUREMENTS (Inches) DENSE GRADED AGGREGATE BASE	PORTLAND CEMENT CONCRETE SURFACE	ASPHALT SURFACE AND BINDER	SURFACE FRICTION LAYER
3+50	0	9.2		3.6	
	36	8.8		4.4	
	72	9.1		4.0	
	108	9.5		4.1	
	144	9.4		4.3	
4+00	0	8.0		4.0	
	36	8.2		4.2	
	72	7.4		4.4	
	108	7.3		4.6	
	144	8.6		4.9	
4+50	0	8.3		4.0	
	36	7.8		4.2	
	72	7.8		4.2	
	108	7.4		4.6	
	144	7.0		4.9	
5+00	0	6.8		4.0	
	36	6.4		4.3	
	72	5.5		4.0	
	108	5.0		4.7	
	144	4.7		5.4	
+					
+					
+					
LAYER NUMBER					

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SPS-8 CONSTRUCTION DATA SHEET 5 PLANT-MIXED ASPHALT BOUND LAYERS AGGREGATE PROPERTIES	* STATE CODE [4 9] * SPS PROJECT CODE [0 8] * TEST SECTION NO. 03 [0 4]

*1. LAYER NUMBER (FROM SHEET 4) [4]

COMPOSITION OF COARSE AGGREGATE AS BUILT FROM CFLHD MIX DESIGN — TYPE — PERCENT

*2. Crushed Stone... 1 Gravel... 2 Crushed Gravel... 3 [3] [_ 4 2.]

*3. Crushed Slag... 4 Manufactured Lightweight... 5 [_] [_ _ _.]

*4. Other (Specify)... 6 ______ [_] [_ _ _.]

COMPOSITION OF FINE AGGREGATE — TYPE — PERCENT

*5. Natural Sand... 1 [2] [_ 5 8.]

*6. Crushed or Manufactured Sand (From Crushed Gravel or [_] [_ _ _.]

*7. Stone... 2 Recycled Concrete... 3 [_] [_ _ _.]
Other (Specify)... 4 ______

*8. TYPE OF MINERAL FILLER [_]
Stone Dust... 1 Hydrated Lime... 2 Portland Cement... 3
Fly Ash... 4
Other (Specify)... 5 ______

BULK SPECIFIC GRAVITIES:

*9. Coarse Aggregate (AASHTO T85 or ASTM C127) [2.5 1 5]

*10. Fine Aggregate (AASHTO T84 or ASTM C128) [2.5 6 7]

*11. Mineral Filler (AASHTO T100 or ASTM D854) [_.— _ _]

*12. Aggregate Combination (Calculated) [2.5 4 5]

13. Effective Specific Gravity of Aggregate Combination [2.5 9 0]
(Calculated) USED WESTERN COLORADO TESTING LAB'S

AGGREGATE DURABILITY TEST RESULTS
(SEE DURABILITY TEST TYPE CODES, TABLE A.13)

	TYPE OF AGGREGATE	TYPE OF TEST	RESULTS % LOSS
14.	Coarse	[0 1]	[_ 37.% _ _]
15.	Coarse	[0 3]	[_ _ 1.3 % _]
16.	Coarse	[_ _]	[_ _ _._ _ _]
17.	Coarse and Fine - Combined	[_ _]	[_ _ _._ _ _]

18. POLISH VALUE OF COARSE AGGREGATES _ _.
SURFACE LAYER ONLY (AASHTO T279, ASTM D3319)

PREPARER [signature] EMPLOYER FHWA - CFLHD DATE 1/28/98

SPS-8 CONSTRUCTION DATA SHEET 6 PLANT-MIXED ASPHALT BOUND LAYERS ASPHALT CEMENT PROPERTIES	* STATE CODE [4 9] * SPS PROJECT CODE [0 8] * TEST SECTION NO. 03 [0 4]

*1. LAYER NUMBER (FROM SHEET 4) [4]

*2. ASPHALT GRADE (SEE ASPHALT CODE SHEET, TABLE A.16) [1 2]
(IF OTHER, SPECIFY) PG 58-34

*3. SOURCE (SEE SUPPLY CODE SHEET, TABLE A.14) [7 2]
(IF OTHER, SPECIFY) Conoco, Salt Lake City, UT

4. SPECIFIC GRAVITY OF ASPHALT CEMENT (AASHTO T228) [1.0 1 4]

GENERAL ASPHALT CEMENT PROPERTIES (If available from supplier)

PG Grade was used

5. VISCOSITY OF ASPHALT AT 140°F (POISES) see ATTACHED paperwork (AASHTO T202) [_ _ _ _ - _.]

6. VISCOSITY OF ASPHALT AT 275°F (CENTISTOKES) (AASHTO T202) [_ _ _ _.- _]

7. PENETRATION AT 77°F (AASHTO T49) (TENTHS OF A MM) (100 g., 5 sec.) [_ _ - _.]

ASPHALT MODIFIERS (SEE TYPE CODE, A.15)

		TYPE	QUANTITY (%)
8.	MODIFIER #1	[-]	[- .]
9.	MODIFIER #2 (IF OTHER, SPECIFY) SBS polymers	[2 7]	[_ ?.]

10. DUCTILITY AT 77°F (CM) (AASHTO T51) [_ - _.]

11. DUCTILITY AT 39.2°F (CM) (AASHTO T51) [_ - _.]

12. TEST RATE FOR DUCTILITY MEASUREMENT AT 39.2°f (CM/MIN) [_ - _.]

13. PENETRATION AT 39.2°F (AASHTO T49) (TENTHS OF A MM) (200 g., 60 sec.) [_ - _.]

14. RING AND BALL SOFTENING POINT (AASHTO T53) (°F) [_ - _.]

NOTE: If emulsified or cutback asphalt was used, enter "N" in the spaces for "Original Asphalt Cement Properties".

CH2M-(FLHD) 4/8/98

SPS-8 CONSTRUCTION DATA SHEET 7 PLANT-MIXED ASPHALT BOUND LAYERS MIXTURE PROPERTIES	* STATE CODE [4 9] * SPS PROJECT CODE [0 8] * TEST SECTION NO. 05 [0 4]

*1. LAYER NUMBER (FROM SHEET 4) [4]

*2. TYPE OF SAMPLES * SEE NOTE ON EACH SECTION [*]
SAMPLES COMPACTED IN LABORATORY... 1
SAMPLES TAKEN FROM TEST SECTION... 2

*3. MAXIMUM SPECIFIC GRAVITY (NO AIR VOIDS) AVERAGE OF SAMPLES B10, B11, B12 [2.3 1 6]
(AASHTO T209 OR ASTM D2041)

BULK SPECIFIC GRAVITY (ASTM D1188) INCLUDES 2-CFLHD's CONTROL STRIPS

*4. MEAN [2.1 7 7] NUMBER OF TESTS [3 1.]

5. MINIMUM [2.1 0 6] MAXIMUM [2.2 3 2]

6. STD. DEV. [2.8 8 9]

ASPHALT CONTENT (PERCENT WEIGHT OF TOTAL MIX)
(AASHTO T164 OR ASTM D2172) AC CONTENT by NUCLEAR OVEN METHOD IN FIEL

*7. MEAN [5.9 3 9] NUMBER OF SAMPLES [2 1.]

8. MINIMUM [5.4 3 _] MAXIMUM [6.8 0 _]

9. STD. DEV. [0.4 5 5]

PERCENT AIR VOIDS SAMPLES FROM TEST SECTION - CORES C10, C11, C12

*10. MEAN [7.6 _ _] NUMBER OF SAMPLES [_ 3.]

11. MINIMUM [7.1 _ _] MAXIMUM [8.1 _ _]

12. STD. DEV. [0.5 0 3]

*13. VOIDS IN MINERAL AGGREGATE (PERCENT) CFLHD's MIX DESIGN [1 5.5]

*14. EFFECTIVE ASPHALT CONTENT (PERCENT) USING #7 MEAN + CFLHD's MIX DESIGN ABSORPTION 1.2 [_ 4.8]

*15. MARSHALL STABILITY (LBS) (AASHTO T245 OR ASTM D1559) [_ _ -._]

*16. NUMBER OF BLOWS [- _]

*17. MARSHALL FLOW (HUNDREDTHS OF AN INCH) [_ _ - _.]
(AASHTO T245 OR ASTM D1559)

*18. HVEEM STABILITY (AASHTO T246 OR ASTM D1561) AVERAGE OF TEST SECTION SAMPLES B10, B11, B12 [_ 3 1.]

*19. HVEEM COHESIOMETER VALUE (GRAMS/25 MM OF WIDTH) [_ _ - _.]
(AASHTO T246 OR ASTM 1561)

SPS-8 CONSTRUCTION DATA SHEET 8 PLANT-MIXED ASPHALT BOUND LAYERS MIXTURE PROPERTIES (CONTINUED)	* STATE CODE [4 9] * SPS PROJECT CODE [0 8] * TEST SECTION NO. 05[0 4]

*1. LAYER NUMBER (FROM SHEET 4) [4]

*2. TYPE OF SAMPLES [__]
SAMPLES COMPACTED IN LABORATORY... 1
SAMPLES TAKEN FROM TEST SECTION... 2

*3. TYPE ASPHALT PLANT [1]

BATCH PLANT... 1 DRUM MIX PLANT... 2

OTHER (SPECIFY)... 3 ________________

*4. TYPE OF ANTISTRIPPING AGENT USED [1 9]
(SEE TYPE CODES, TABLE A.21)
OTHER (SPECIFY) ________________

*5. AMOUNT OF ANTISTRIPPING AGENT USED LIQUID OR SOLID CODE [2]

*6. (If liquid, enter code 1, and amount as percent of asphalt cement weight. If solid, enter code 2 and amount as percent of aggregate weight.) [__ 1.0]

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SPS-8 CONSTRUCTION DATA SHEET 9 PLANT-MIXED ASPHALT BOUND LAYERS PLACEMENT DATA	* STATE CODE [4 9] * SPS PROJECT CODE [0 8] * TEST SECTION NO. 03, [0 4]

*1. DATE PAVING OPERATIONS BEGAN (Month-Day-Year) [09-25-97] 12:3

*2. DATE PAVING OPERATIONS COMPLETED (Month-Day-Year) [10-21-97]

*3 ASPHALT CONCRETE PLANT AND HAUL

	Type	Name	Haul Distance (Mi)	Time (Min)	Layer Numbers	Sec.
Plant 1	[1]	Valley Asphalt @ Z-lake	[_ 1 0]	[1 5]	[1] [2] [3]	04
Plant 2	[_]		[_ _ _]	[_ _]	~~[1] [2] [_]~~	03
Plant 3	[_]		[_ _ _]	[_ _]	[_] [_] [_]	

Plant Type: Batch..... 1 Drum Mix.... 2 Other...3 Specify______

4. MANUFACTURER OF ASPHALT CONCRETE PAVER Blaw Knox / Barber Greene Windrow

5. MODEL DESIGNATION OF ASPHALT CONCRETE PAVER PF5510 / 061

6. SINGLE PASS LAYDOWN WIDTH (Feet) [1 5.5]

7. AC ~~BINDER~~ SURFACE COURSE LIFT SECTION 03 4" depth
Layer Number [_ _]
Nominal First Lift Placement Thickness (Inches) [2.0]
Nominal Second Lift Placement Thickness (Inches) [2.0]

8. AC SURFACE COURSE LIFT Section 04 7" depth
Layer Number [_ _]
Nominal First Lift Placement Thickness (Inches) [2.5]
Nominal Second Lift Placement Thickness (Inches) [2.5]
Third Lift 2.0

9. SURFACE FRICTION ~~COURSE~~ (If Placed)
Layer Number [NA]
Nominal Placement Thickness (Inches) [N.A]

10. TEST SECTION STATION OF TRANSVERSE JOINTS (within test section)
Binder Course [_ + NA]
Surface Course [_ + _ _]
Surface Friction Course [_ + _ _]

11. LOCATION OF LONGITUDINAL SURFACE JOINT [1]
Between lanes.. 1 Within lane.. 2
(specify offset from O/S feet) [1 5.5]

12. SIGNIFICANT EVENTS DURING CONSTRUCTION (disruptions, rain, equip. problems, etc.) Rain, Lack of Aggregate, Clay pumping (removed)

SPS-8 CONSTRUCTION DATA SHEET 10 PLANT-MIXED ASPHALT BOUND LAYERS COMPACTION DATA	* STATE CODE [4 9] * SPS PROJECT CODE [0 8] * TEST SECTION NO. 03, [0 4]

*1. DATE PAVING OPERATIONS BEGAN (Month-Day-Year) [09-25-97]

*2. DATE PAVING OPERATIONS COMPLETED (Month-Day-Year) [10-21-97]

*3. LAYER NUMBER [1]

*4. MIXING TEMPERATURE (°F) [300.]

5. LAYDOWN TEMPERATURES (°F) PETE PRADERE of NICHOLS TOOK TEMPS

Mean.................. ___. Number of Tests .... ___.

Minimum............... ___. Maximum................. ___.

Standard Deviation... __.__

ROLLER DATA

	Roller Code #	Roller Description	Gross Wt (Tons)	Tire Press. (psi)	Frequency (Vibr./Min)	Amplitude (Inches)	Speed (mph)
6	A	Steel-Whl Tandem	__.__				
7	B	Steel-Whl Tandem	__.__				
8	C	Steel-Whl Tandem	__.__				
9	D	Steel-Whl Tandem	__.__				
10	E	Pneumatic-Tired	__.__	____.			
11	F	Pneumatic-Tired	__.__	____.			
12	G H-108	Pneumatic-Tired	__.__	____.			
13	H	Pneumatic-Tired	__.__	____.			
14	I	Single-Drum Vibr.	__.__		____.	.___	__.__
15	J CS-433C	Single-Drum Vibr.	__.__		____.	.___	__.__
16	K	Single-Drum Vibr.	__.__		____.	.___	__.__
17	L	Single-Drum Vibr.	__.__		____.	.___	__.__
18	M	Double-Drum Vibr.	__.__		____.	.___	__.__
19	N DD-110	Double-Drum Vibr.	__.__		____.	.___	__.__
20	O	Double-Drum Vibr.	__.__		____.	.___	__.__
21	P	Double-Drum Vibr.	__.__		____.	.___	__.__
22	Q	Other					

	COMPACTION DATA	First Lift SECTION 03	Second Lift	SECTION 04 ~~Third~~ Lift 1ST	~~Fourth~~ Lift 2nd
	BREAKDOWN Ingersoll Rand DD-110				
23	Roller Code (A-Q)	_	_	M	M
24	Coverages	__.	__.	_5.	_5.
	INTERMEDIATE CAT H-108				
25	Roller Code (A-Q)	_	_	E	E
26	Coverages	__.	__.	_4.	_4.
	FINAL CAT CS-433C				
27	Roller Code (A-Q)	_	_	I	I
28	Coverages	__.	__.	_4.	_4.
29	Air Temperature (°F)	03 _81.	08 _81.	04 _80.	04 _80.
30	Compacted Thickness (In)	2.0	2.0	2.5	2.5
31	Curing Period (Days)	_1.0	_1.0	_1.0	_1.0

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SPS-8 CONSTRUCTION DATA SHEET 11 PLANT-MIXED ASPHALT BOUND LAYERS DENSITY AND PROFILE DATA	* STATE CODE [4 9] * SPS PROJECT CODE [0 8] * TEST SECTION NO. [0 4]

1. NUCLEAR DENSITY MEASUREMENTS T31 10/16/97 53+50 6' Rt of ¢

LAYER TYPE	Binder Course	Surface Course	Surface Friction Layer
Measurement Method (A, B, C)[1]	__	B	__
Number of Measurement	__ __	133.8 135.2 133.9 135.3	__ __
Average (pcf)	__ __ __.__	134.55	__ __ __.__
Maximum (pcf)	__ __ __.__	135.3	__ __ __.__
Minimum (pcf)	__ __ __.__	133.8	__ __ __.__
Standard Deviation (pcf)	__ __ __.__	__ __ 0.8	__ __ __.__
Layer Number	__ __	__ 4	__ __

[1] Measurement Method Backscatter... A Direct Transmission... B Air Gap... C

2. MANUFACTURER OF NUCLEAR DENSITY GAUGE Troxler

3. NUCLEAR DENSITY GAUGE MODEL NUMBER 3440

4. NUCLEAR DENSITY GAUGE IDENTIFICATION NUMBER 15175

5. NUCLEAR GAUGE COUNT RATE FOR STANDARDIZATION _ 2961

6. PROFILOGRAPH MEASUREMENTS

Profilograph Type California... 1 Rainhart... 2 — 1
Profile Index (Inches/Mile) — __ 8
Interpretation Method Manual.. 1 Mechanical.. 2 Computer.. 3 — 1
Height of Blanking Band (Inches) — 0.2 __
Cutoff Height (Inches) — 0.4 __

7. SURFACE PROFILE USED AS BASIS OF INCENTIVE PAYMENT? (YES, NO) YES

SPS-8 CONSTRUCTION DATA SHEET 11 PLANT-MIXED ASPHALT BOUND LAYERS DENSITY AND PROFILE DATA	* STATE CODE [4 9] * SPS PROJECT CODE [0 8] * TEST SECTION NO. [0 4]

1. NUCLEAR DENSITY MEASUREMENTS T32 10/16/92 55+00 6' LT of 4

LAYER TYPE	Binder Course	Surface Course	Surface Friction Layer
Measurement Method (A, B, C)[1]	_	B	_
Number of Measurement	_ _	136.7 136.1 133.9 137.0	_ _
Average (pcf)	_ _ _._	1 3 5.9	_ _ _._
Maximum (pcf)	_ _ _._	1 3 7.0	_ _ _._
Minimum (pcf)	_ _ _._	1 3 3.9	_ _ _._
Standard Deviation (pcf)	_ _ _._	_ _ 1.4	_ _ _._
Layer Number	_ _	_ 4	_ _

[1] Measurement Method Backscatter... A Direct Transmission... B Air Gap... C

2. MANUFACTURER OF NUCLEAR DENSITY GAUGE Troxler

3. NUCLEAR DENSITY GAUGE MODEL NUMBER 3440

4. NUCLEAR DENSITY GAUGE IDENTIFICATION NUMBER 15175

5. NUCLEAR GAUGE COUNT RATE FOR STANDARDIZATION _ 2 9 6 1

6. PROFILOGRAPH MEASUREMENTS

Profilograph Type California... 1 Rainhart... 2 1
Profile Index (Inches/Mile) _ 8
Interpretation Method Manual.. 1 Mechanical.. 2 Computer.. 3 1
Height of Blanking Band (Inches) 0.2 _
Cutoff Height (Inches) 0.4 _

7. SURFACE PROFILE USED AS BASIS OF INCENTIVE PAYMENT? (YES, NO) Yes

SPS-8 CONSTRUCTION DATA SHEET 11 PLANT-MIXED ASPHALT BOUND LAYERS DENSITY AND PROFILE DATA	* STATE CODE [4 9] * SPS PROJECT CODE [0 8] * TEST SECTION NO. [0 4]

1. NUCLEAR DENSITY MEASUREMENTS T33 10/16/92 56+50 6' Rt of ℄

LAYER TYPE	Binder Course	Surface Course	Surface Friction Layer
Measurement Method (A, B, C)[1]	_	B	_
Number of Measurement	_ _	141.7 136.3 137.4 138.6 _ _	_ _
Average (pcf)	_ _ _._	138.5	_ _ _._
Maximum (pcf)	_ _ _._	141.7	_ _ _._
Minimum (pcf)	_ _ _._	136.3	_ _ _._
Standard Deviation (pcf)	_ _ _._	_ _ 2.3	_ _ _._
Layer Number	_ _	_ 4	_ _

[1] Measurement Method Backscatter... A Direct Transmission... B Air Gap... C

2. MANUFACTURER OF NUCLEAR DENSITY GAUGE Troxler

3. NUCLEAR DENSITY GAUGE MODEL NUMBER 3440

4. NUCLEAR DENSITY GAUGE IDENTIFICATION NUMBER 15175

5. NUCLEAR GAUGE COUNT RATE FOR STANDARDIZATION _ 2 9 6 1

6. PROFILOGRAPH MEASUREMENTS

Profilograph Type California... 1 Rainhart... 2 1
Profile Index (Inches/Mile) _ 8
Interpretation Method Manual.. 1 Mechanical.. 2 Computer.. 3 1
Height of Blanking Band (Inches) 0.2 _
Cutoff Height (Inches) 0.4 _

7. SURFACE PROFILE USED AS BASIS OF INCENTIVE PAYMENT? (YES, NO) Yes

PREPARER EMPLOYER DATE

SPS-8 CONSTRUCTION DATA SHEET 12 LAYER THICKNESS MEASUREMENTS	* STATE CODE [4 9] * SPS PROJECT CODE [0 8] * TEST SECTION NO. 03 [0 4]

Pete Pradere of Nichols took depth measurements.

SHEET 1 OF 2

STATION NUMBER	OFFSET (Inches)	LAYER THICKNESS MEASUREMENTS (Inches): DENSE GRADED AGGREGATE BASE	PORTLAND CEMENT CONCRETE SURFACE	ASPHALT SURFACE AND BINDER	SURFACE FRICTION LAYER
0+00	0	12.7		6.7	
	36	12.5		7.1	
	72	12.4		7.1	
	108	11.6		7.2	
	144	11.6		7.4	
0+50	0	12.6		7.0	
	36	12.2		7.2	
	72	11.6		7.2	
	108	11.8		7.3	
	144				
1+00	0	12.7		6.8	
	36	12.7		7.1	
	72	12.7		7.1	
	108	13.2		7.4	
	144				
1+50	0	11.9		6.5	
	36	11.8		6.8	
	72	11.3		7.0	
	108	11.3		7.2	
	144				
2+00	0	11.2		6.6	
	36	11.2		6.8	
	72	10.9		7.0	
	108	10.9		7.1	
	144				
2+50	0	12.2		6.4	
	36	13.2		6.5	
	72	13.4		6.4	
	108	13.4		6.2	
	144				
3+00	0	12.8		6.7	
	36	12.0		6.8	
	72	10.9		7.1	
	108	11.0		6.7	
	144				
LAYER NUMBER					

SPS-8 CONSTRUCTION DATA SHEET 12 LAYER THICKNESS MEASUREMENTS	* STATE CODE [4 9] * SPS PROJECT CODE [0 8] * TEST SECTION NO. 03 [0 4]

Pete Pradere of Nichols took depth Measurements. SHEET 2 OF 2

STATION NUMBER	OFFSET (Inches)	LAYER THICKNESS MEASUREMENTS (Inches)			
		DENSE GRADED AGGREGATE BASE	PORTLAND CEMENT CONCRETE SURFACE	ASPHALT SURFACE AND BINDER	SURFACE FRICTION LAYER
3+50	0	12.6		6.8	
	36	12.7		6.8	
	72	13.0		6.8	
	108	12.2		6.8	
	144				
4+00	0	12.8		6.8	
	36	13.2		7.0	
	72	12.2		7.0	
	108	11.9		7.1	
	144				
4+50	0	10.9		7.0	
	36	10.4		7.2	
	72	9.8		7.1	
	108	10.1		7.1	
	144				
5+00	0	12.0		7.1	
	36	11.4		7.2	
	72	11.8		7.1	
	108	11.5		7.4	
	144				
+					
+					
+					
LAYER NUMBER					